

**CONSERVATION PLANNING FOR THE
MANAGEMENT AND PROTECTION
OF NATURAL AREAS
IN THE ALBEMARLE-PAMLICO ESTUARINE
STUDY AREA OF VIRGINIA**

FINAL REPORT

Submitted To:

Virginia Coastal Resource Management Program
Department of Environmental Quality

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OF VIRGINIA**

Prepared by the
Virginia Department of Conservation and Recreation
Division of Natural Heritage
1500 East Main Street, Suite 312
Richmond, VA 23219

Principle Investigator and Authors
Sandra Erdle
Melissa Donoff
Caren Caljouw
Larry Smith

Contributing Authors
Kennedy Clark
Shepard Moon
Janit L. Potter



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Bill Moorhead - Ecologist
Gary Fleming - Field Ecologist
Christopher Ludwig - Botanist
Sarah Mabey - Migratory Songbird Research Specialist
Thomas Rawinski - Vegetation Ecologist
Steve Roble - Zoologist
Chris Hobson - Field Zoologist
Nancy Van Alstine - Field Botanist
Steven Carter-Lovejoy - Information Manager
Sarah Holbrook - Data Specialist
Megan Rollins - Data Specialist
Harold Evans - Conservation Intern
Caren Caljouw - Stewardship Coordinator
Kennedy Clark - Stewardship Biologist
Sandra Erdle - Conservation Planner
Lawrence Smith - Natural Areas Program Manager
Melissa Donoff - Natural Area Protection Specialist
Tom Stuart - Landscape Architect

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INTRODUCTION

In 1992, the Department of Conservation and Recreation - Division of Natural Heritage was awarded a Coastal Resources Management Program grant to complete a conservation planning project for selected natural areas identified in the Albemarle-Pamlico Estuarine Study (APES) region in Virginia. Matching funds were provided by the Virginia Department of Conservation and Recreation. This report relates the methods, results, and conclusions from the conservation planning effort for ten natural areas and two natural area macrosites of the Albemarle-Pamlico Estuarine Study (APES) region in Virginia. The ten natural areas presented in this report comprise some of the most significant unprotected natural areas within APES region. The purpose of the conservation planning project is to provide comprehensive information to guide the management and protection for these significant natural areas.

The Albemarle-Pamlico region is located in the southeastern portion of Virginia and includes all or part of ten counties and three cities. This region encompasses approximately 10 percent of the state's acreage and includes the Chowan and Dismal Swamp drainage basins, and portions of the Coastal Plain and Piedmont physiographic provinces.

This conservation planning project follows a 1991-1993 natural areas inventory in the study area. The Virginia Department of Conservation and Recreation - Division of Natural Heritage, was contracted by the U.S. Environmental Protection Agency and the Virginia Coastal Resources Management Program in 1991 and 1992 to conduct a natural areas inventory of the Albemarle-Pamlico Estuarine Study region in Virginia. The goal of the inventory was to systematically identify the region's best remaining natural areas, wetlands and rare species sites. Fifty-seven significant natural areas were documented in this study. The final report for the natural areas inventory was completed in 1993 (Rawinski and Fleming).

Individual objectives for this conservation planning project include the development of natural area protection boundaries, natural area management and protection strategies, the implementation of a natural area landowner contact and education program, and site protection for these high priority natural areas. The goal of the conservation planning project for the APES region is to provide comprehensive and refined information to guide the management and protection for the ten significant natural areas selected for the project.

To complete this project, additional information on the natural heritage resources, threats, site management and protection needs, and ownership were collected for each natural area. Forty-three landowners were contacted by Department of

Conservation and Recreation staff in an effort to educate them about the ecological significance of their land and to discuss natural area management and protection needs.

By combining the new data with existing knowledge from the inventory project, the following information was provided for each of the ten natural areas through this project:

- refined conservation planning boundaries and biodiversity ranks for the ten state - significant natural areas and two macrosites;
- more detailed descriptions for the natural heritage resources and ecological significance of each site, expanded protection and stewardship recommendations for each natural area;
- further information on the current status and use of each site;
- basic information regarding ownership and zoning of each natural area;
- considerations for the recreational, scenic, and educational value of each site; and
- information regarding options local governments can utilize to protect their natural areas.

The purpose of this information is to facilitate better natural area protection and ecological management, well-informed planning, and wise land use decisions by natural resource agencies, conservation groups, and local governments. The information will help guide the local decision makers in their endeavors to actively protect the natural diversity of their localities. The report can be further utilized to increase awareness of local officials and residents of regional biodiversity issues, guide environmental review of projects which may affect the natural areas, and to assist local conservation organizations in their land conservation and environmental education efforts.

The involvement of the Virginia Department of Conservation and Recreation in the conservation of these natural areas does not end with the submission of this final report. The Department is committed to providing assistance and support to local governments, developers, consultants, conservation organizations, businesses, and private citizens concerned with the preservation of biodiversity in the remaining natural areas of the APES region. Additional meetings will occur with natural area owners here to further the site protection and management objectives.

OVERVIEW OF THE DCR - DIVISION OF NATURAL HERITAGE

The Virginia Natural Area Preserves Act of 1989 (section 10.1-209 et seq., Code of Virginia) directs the Virginia Department of Conservation and Recreation to "preserve the natural diversity of biological resources of the Commonwealth." The Act further establishes the Virginia Natural Heritage Program and requires the Department to develop a natural heritage plan, produce an inventory of the Commonwealth's natural heritage resources, maintain a natural heritage data bank of inventory data, and provide for the protection and stewardship of natural areas. The Department of Conservation and Recreation - Division of Natural Heritage fulfills this mandate. The DCR - Division of Natural Heritage is the Commonwealth's principal collector and manager of information on natural heritage resources and performs a variety of protection and stewardship tasks for priority natural areas and natural heritage resources throughout the state. Natural heritage resources are defined as "the habitat of rare, threatened, or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest" (section 10.1-209, Code of Virginia). The Virginia Natural Area Preserves Act defines natural area as "any area of land, water, or both...which is important in preserving rare or vanishing flora, fauna, native ecological systems, geologic, natural historical, scenic, or similar features...of the Commonwealth" (section 10.1-209, Code of Virginia).

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Each natural heritage resource is assigned a rank that indicates its relative rarity on a five-point scale (1 = extremely rare, 5 = common) or otherwise indicates the status of the species with letters (eg, X = apparently extirpated). Table 1 defines each rank in detail. Each natural heritage resource receives two ranks. One rank indicates the resource's rarity throughout its entire range (the global or "G" rank) and the other indicates the resource's rarity within Virginia (the state or "S" rank). For example, mountain camellia is ranked as G4/S2 indicating the species is uncommon throughout its range and very rare in Virginia.

The primary criterion for ranking natural heritage resources is the

number of occurrences, that is the number of known distinct locations containing that resource. Also of great importance to the ranking process is the number of individuals at each location or, for highly mobile organisms, the total number of individuals. Other considerations include the condition of the occurrences, the number of protected occurrences, and threats. Although all species protected under state or federal endangered species laws are rare, not all rare species are listed as endangered or threatened. Natural heritage rarity ranks should not be interpreted as legal designations, but as indices of known biological rarity.

In addition to ranking each natural heritage resource in terms of rarity, Department of Conservation and Recreation scientists also rank each location or occurrence of natural heritage resources in Virginia on a four-point scale (A = excellent, D = poor), so that protection efforts can be aimed not only at the rarest natural heritage resources, but at the best examples of each. In the case of species, an occurrence of a natural heritage resource is ranked according to its quality (size and vigor of population, etc.), condition (natural quality of habitat, etc.), viability (the likelihood of long-term survival of resource), and defensibility (level of difficulty of protecting the resource). Given the intimate relationship between a natural community and its environment, occurrences of rare or exemplary natural communities are ranked in terms of their quality and size.

TABLE 1 - DEFINITION OF NATURAL HERITAGE RARITY RANKS

State rarity ranks are defined below; global rarity ranks are similar, but refer to a species rarity throughout its entire range. State and global ranks are denoted, respectively, with an "S" and a "G" followed by a character. Note that GA and GN are not used and GX means extinct. These ranks should not be interpreted as legal designations.

-
- S1 extremely rare; usually five or fewer occurrences in the state or may be few remaining individuals; often very vulnerable to extirpation;
 - S2 very rare; usually between five and twenty occurrences or with many individuals in fewer occurrences, often susceptible to becoming extirpated;
 - S3 rare to uncommon; usually between twenty and one hundred occurrences; may have fewer occurrences, but with many large number of individuals in some populations; may be vulnerable to large-scale disturbances;
 - S4 uncommon to common; usually more than one hundred occurrences, but may be fewer occurrences with many large populations; may be restricted to only a portion of the state; not usually vulnerable to immediate threats;
 - S5 very common; demonstrably secure under present conditions;
 - SA accidental in the state;
 - SH historically known from the state, but not verified for an extended period (usually fifteen or more years); this rank is used primarily when inventory has been attempted recently;
 - SN regularly occurring migrants, transients, or non-breeding seasonal residents; usually no specific site can be identified with its range in the state; note that congregation and staging areas are monitored separately;
 - SU status uncertain; often because of low search effort or cryptic nature of the resource;
 - SX apparently extirpated from the state

One of the many ways that the DCR - Division of Natural Heritage uses the ranks of natural heritage resources and their locations is to assess the biodiversity significance of natural areas, which may include only one natural heritage resource or may harbor many. Based upon the ranks, each site is assigned a biodiversity (or "B") rank on the following five-point scale:

- B1 outstanding significance, only known site for a natural heritage resource or an excellent occurrence of a G1 species;
- B2 very high significance, the best example of any natural community type, a good occurrence of a G1 species, or an excellent occurrence of a G2 or G3 species;
- B3 high significance, excellent example of any natural community type, a good occurrence of a G3 species;
- B4 moderate significance, a good example of a rare natural community type, a fair occurrence of a G3 species, an excellent or good occurrence of a S1 or S2 species;
- B5 general significance, fair to poor occurrence of a rare natural community, an S1 species, or S2 species, an excellent or good occurrence of a S3 species.

Natural areas which harbor many natural heritage resources may have their B rank upgraded to a level higher than that which would be indicated by the presence of any one of the resources. For example, a site containing good occurrences of four different G3 species would be ranked B2, rather than B3.

REVIEW OF NATURAL AREAS INVENTORY

The goal of the Albemarle-Pamlico natural areas inventory conducted from 1991 to 1992 was to systematically identify the best remaining natural areas of the region. The natural areas inventory was conducted in six steps:

- 1) review aerial photographs,
- 2) gather existing information,
- 3) conduct aerial reconnaissance of potential natural areas,
- 4) perform an initial ground survey,
- 5) complete a thorough biological survey of each potential natural area, and;
- 6) compile the results and prepare a final report.

A total of fifty-seven ecologically significant natural areas were documented from the region. The sites were prioritized according to their biological significance, described in detail, and mapped.

Further information regarding the inventory project can be found in An Inventory for Southeast Virginia's Critical Natural Areas, Exemplary Wetlands, and Endangered Species Habitats Natural Heritage Technical Report 93 - 13 (Rawinski and Fleming, 1993).

METHODS

COLLECTION OF INFORMATION

For this conservation planning project, existing knowledge regarding the natural areas and new information relevant to their conservation and the natural heritage resources they support were collected and studied. Recent aerial photography, soil surveys, field notes from the inventory project, scientific publications, and conservation literature were included in this review. Additionally, several scientific and conservation experts outside of the DCR - Division of Natural Heritage were consulted for their specialized information or skills relating to conservation of the natural areas.

Property ownership and zoning was researched for each natural area from county or city records. Basic ownership and zoning information is provided in each natural area report presented in the results section.

Each natural area was visited at least once during the data collection phase of this project. During the visits, efforts were made to find the natural heritage resources originally documented by the inventory project, locate additional resources associated with the sites, assess the condition of the resources, determine threats to the resources, and establish what protection and stewardship measures are necessary to insure the long-term survival of the resources.

CONSERVATION PLANNING PRINCIPLES

Standard natural heritage conservation planning guidelines were used for this project. The first step of conservation planning involved gathering of information relevant to the site including information on natural heritage resources, geology, hydrology, landscape features, economic and social factors of a site. An ecological analysis of this information is conducted and provides the scientific foundation for the conservation planning process. In addition a stress analysis is conducted and provides information which will shape the protection and management recommendations included in the plan. After these analyses are completed, the ecological boundaries are determined and landownership information is compiled. The ownership information allows for further refinement of the protection strategies. Stewardship strategies are best determined with an understanding

of ecological forces influencing a natural area and particular ecosystems. In developing management recommendation, the following categories are considered: ecological management, monitoring, research, inventory, and public use/facilities management.

Additional information on these planning guidelines can be found in the Preserve Selection and Design Manual of The Nature Conservancy and in site conservation planning procedures outlined in reports of the DCR - Division of Natural Heritage.

ECOLOGICAL BOUNDARIES

A principle component of conservation planning for any natural area is the conservation planning, or ecological boundaries. Preliminary conservation boundaries, such as those established in the APES natural areas inventory, are carefully refined into two ecological boundaries: primary and secondary. It should be noted here that these boundaries are delineated for planning purposes only and have no regulatory intent.

The primary ecological boundary encompasses the natural heritage resources of the site and the secondary ecological boundary includes all areas intended to mitigate threats to the natural heritage resources and allow for proper ecological management. The area within the primary boundary should normally be restricted from disturbance of any kind, while some environmentally sensitive land uses are compatible with the conservation of the area between the primary and secondary boundaries.

The primary ecological boundary simply includes all known occurrences of natural heritage resources at a site. Because "natural heritage" resource is defined (in part) as the habitat of rare species, the primary ecological boundary encompasses the locations where rare species have been documented as well as the surrounding habitats in which they are likely to be found. The conservation planner should be intimately familiar with the habitat requirements of the species in question and the habitats available in the natural area. Primary ecological boundaries around rare or exemplary natural communities delineate the extent of the communities. This requires the planner to be knowledgeable regarding the ecological parameters defining the natural community type. The primary ecological boundary does not include any "buffer" to separate the natural heritage resources from the effects of adjacent land (or water) uses. Primary ecological boundaries may also include species movement corridors connecting two or more stations of natural heritage resources of the same type within a single natural area. Corridors are only included in the primary ecological boundary where they are determined to be essential habitat for the survival of the resources within the natural area.

The secondary ecological boundary includes all lands and water

intended to mitigate natural and human threats to the natural heritage resources of the site and lands related to special management needs. The secondary ecological boundary is often used to indicate an area within which certain land (or water) uses may affect the viability of the natural heritage resources. Occasionally, secondary ecological boundaries are also used to designate areas for some types of ecological management or scientific research, such as areas for fire breaks for prescribed burning or wildfire control. Secondary ecological boundaries may also include species movement corridors. Unlike corridors within primary ecological boundaries, corridors designated by secondary ecological boundaries normally connect two or more natural areas containing similar resources, not similar habitats within a single natural area.

The most common purpose of secondary ecological boundaries is to provide a buffer zone to the primary, or core, area. Buffer zones are areas of transition between natural heritage resources and surrounding land uses designed to protect the resources within the primary boundary from damage or degradation. Even the strongest and most complete protection of the core area containing natural heritage resources would be useless if surrounding land uses incompatible with the existence of the natural heritage resources were not attenuated. Buffer zones are generally the most effective and convenient way to protect natural heritage resources from surrounding incompatible land uses. The size and composition of a buffer zone varies depending upon the biology of the natural heritage resource and the disturbances to which it may be subjected. A buffer zone may be designed to protect the core area by maintaining surface and ground water quality and quantity, preventing alterations of ambient light, temperature, humidity, or wind conditions, or screening sensitive organisms from human activities and noise. Buffer zones can also be designed to minimize soil erosion and to prevent the invasion of aggressive or "weedy" species.

The design of effective secondary ecological boundaries requires that the planner be familiar with the biology and threats of the natural heritage resource and have a basic understanding of how ecosystems function. An understanding of the structure, function, and uses of the landscape and movement patterns of species upon the landscape is also essential. For these reasons, site visits to targeted natural areas are mandatory before accurate ecological boundaries can be designed.

The best and most current information is always used to guide the conservation planning decisions. As the knowledge of the biological, geological, hydrological, social, and economic aspects of the natural area increases or changes, alterations or revisions in the ecological boundaries may be necessary to reflect the updated information. In some cases, complete information is not available. For example, the biology of some species is not

well-understood due to a lack of scientific research or sometimes abiotic (non-living) environmental factors, such as ground water flow patterns or soil composition, have not been determined for an area. In these cases, conservation planning decisions are based upon the available information on and knowledge extrapolated from similar species, natural communities, and ecosystems.

The determination of compatible activities and uses within the primary and secondary ecological boundaries is dependent upon the biology of the natural heritage resources of the site and the ecology of the natural area. Land use standards are specific to each site and may vary even among sites that support similar natural heritage resources if other environmental factors are different.

Secondary ecological boundaries are not designed to protect the natural heritage resources from large scale environmental catastrophes such as global warming or acidic precipitation. Solutions to these broad problems must be addressed in similarly broad environmental education, policies, and regulations.

Primary and secondary ecological boundaries should not be interpreted as regulatory zones or acquisition boundaries, but as conservation tools to help guide the protection and stewardship of natural heritage resources.

Ecological boundaries for each natural area are presented in the site accounts in the results and recommendations section.

PROTECTION OF NATURAL AREAS

Many natural area protection tools are available to local governments, conservation organizations, natural resource agencies, and private citizens. Examples include acquisition, easements, natural area registry, and conservation zoning. Figure 1 depicts a conceptual model of land protection tools used by the Department of Conservation and Recreation. Local governments have all of these protection tools available for their use to them plus several protection options unique to local governments. A document to guide local governments in their efforts to secure protection of the natural areas within their jurisdictions appears in Appendix A.

An important component of the APES conservation planning project was the task of contacting natural area landowners and seeking protection for these natural areas.

Several protection options are available to ensure the conservation of natural heritage resources and the natural areas in which these resources occur. The options are chosen to meet the individual needs of the particular area of land as well as the desires of the individual landowner. A specific protection tool may be used individually or more than one may be used in conjunction with

another. Some options encourage voluntary protection, without legal implications or long-term commitments; other options legally protect property for extended periods or permanently to ensure protection today as well as the future.

LANDOWNER CONTACT

One of the most simple, but crucial, tools for protecting natural areas is a landowner contact program. Many natural areas are degraded simply due to lack of knowledge. It is extremely important to inform the landowners that their property is ecologically significant. It is very difficult for someone to protect a resource if they are unaware that it exists.

The purpose of this program is three-fold:

1. to inform natural area owners that their land is of high ecological significance;
2. to educate landowners about the natural heritage resources on their property, the value of protecting biological diversity, reasons for species or natural community rarity, and the threats, management, and conservation needs of their site; and,
3. to establish a positive relationship with a landowner so that future contact and conservation strategies may be approached.

Five steps are involved in the process of contacting landowners: conducting ownership research, preparing introductory letters, scheduling personal meetings, compiling site packages, and visiting the landowner. Once the significant lands are determined, ownership information and boundary maps are collected from local courthouses. Next, an introductory letter is mailed that briefly explains our Department's purpose, why the owner's land is significant, and the request for a meeting in the near future.

Approximately two weeks after mailing the letters, the landowners will be contacted by telephone to set a meeting date to discuss the natural area. Site packages describing the natural heritage resources will be given to the owners during the visit. The contents of the packages include a Department of Conservation and Recreation brochure, a DCR - Division of Natural Heritage brochure, a fact sheet describing the natural area, a fact sheet or other information about the species within the natural areas, and a fact sheet describing Virginia's Registry of Natural Areas. In addition to supplying the owner with this information, the location and features of their land will be pointed out using boundary maps, topographic maps, and aerial photographs.

General information about the landowners, their feelings towards conservation, their future plans for the land, and other information learned during the visit will be recorded on a

landowner contact report form after the visit (Appendix B). Thank-you letters and other correspondences are mailed within a month after the meeting. It is extremely important to keep in touch with the owner after the initial contact is established.

Once a relationship is established with private or public landowners through landowner contact, stronger protection for natural areas such as registry, management agreements, easements or acquisitions may result.

NATURAL AREA REGISTRY

Virginia's Natural Area Registry is a protection tool which involves a voluntary commitment by the landowner to protect the site under his or her ownership. No legal agreement is signed and permanent natural area protection does not occur. The Natural Area Registry program encourages landowners of significant natural areas throughout Virginia to voluntarily protect the resources on their land to the best of their ability. Landowners who participate in the registry program agree to inform DCR of any potential threats to the resources or other changes, such as intent to sell the property.

Aside from being rewarded with the pride of conserving one of the most significant natural areas in Virginia, the owner receives a plaque in recognition of the significance of their property and their effort in preserving it. In addition, the landowner may receive management advice and assistance from professional natural area management staff, if they so desire.

The Natural Area Registry is an option available to both public and private landowners and may be used alone or in conjunction with another protection tool, such as a management agreement.

More specific information about the Virginia Natural Area Registry program is included in Appendix C and Appendix D.

NATURAL AREA MANAGEMENT AGREEMENTS

A management agreement is an appropriate option for landowners who have been managing their land as conservation-minded stewards but have no desire to sell their property or encumber the land with an easement. Such a landowner would like to continue to own and manage their property in a way which will protect the resources on their land. The management agreement is a legal agreement but it does not provide permanent protection for the land. If this option is chosen, the landowner and the Department of Conservation and Recreation will prepare agreement that clearly states the management objectives, schedules, and responsibilities. This agreement must be acceptable to both parties. These agreements fulfill the conservation goals of the Department of Conservation and Recreation while meeting the individual needs of the landowner

as well.

OPEN SPACE EASEMENTS

An open space easement provides stronger natural area protection than the previously mentioned options. An easement is a legal agreement recorded with the property deed which restricts certain property rights in perpetuity. This is an excellent option for property owners who take pride in their land for its beauty, natural resources, family heritage, etc. and want to ensure that future generations will be able to enjoy the land in its natural condition. The landowner gives up a property right, such as the right to subdivide the land for development in order to achieve specific conservation goals, yet still enjoys many other property rights, such as the right to farm. This option is quite flexible in that, depending upon the landowners wishes, the easement may be strict to ensure no future land disturbance or it may place very limited restrictions. Open space easements may reduce federal estate taxes and Virginia inheritance taxes, reduce assessment for real estate purposes, and entitle the landowner to a charitable deduction for state and federal income tax purposes.

NATURAL AREA DEDICATION

Natural Area Preserve Dedication the strongest protection tool available to natural areas. Dedication is a legal process whereby the landowner restricts future uses of a property for the purpose of preserving the land in its natural state. Dedication of a property places it in the Virginia Natural Areas Preserve System. This protection option is available to private landowners, state agencies, or other public body (excluding federal). With dedication, the private landowner retains ownership rights of the property as well as the right to sell or transfer the property. However, the landowner relinquishes the rights to use the land in ways which are inappropriate for the preservation goals for the property. Only lands of the highest ecological significance qualify for inclusion in Virginia Natural Area Preserve System. In addition to the satisfaction of preserving important natural heritage resources, the landowner also receives the same financial incentives as available for open space easements.

NATURAL AREA ACQUISITION

The most direct method for conservation of natural areas is acquisition of the property. Though, due to the limited amount of funds available and the expense of land, this option is only applicable to a small percentage of the most ecologically significant natural areas in Virginia.

STEWARDSHIP GUIDELINES

Natural area stewardship involves the administration and management

of a natural area after it is protected to assure the long-term survival of the natural heritage resources it supports. Basic stewardship recommendations are given for each natural area in the results and recommendations section. The higher priority sites (B1-B3) deserve comprehensive stewardship plans.

An important aspect of stewardship is determining compatible and incompatible land (and water) uses within the natural area. Which land uses are harmonious with the resources will depend upon the type of natural heritage resource, the ecosystem, and the type of land use being considered. Allowable land uses will therefore vary from site to site. Certain forms of some land uses may be incompatible, while more environmentally sensitive methods of the same general land use type may be compatible. For example, clearcutting of timber within a buffer zone delineated by the secondary ecological boundary of a given natural area may produce unacceptable effects to the natural heritage resources of the site, but selective cutting with strict environmental performance standards may be compatible. For some natural heritage resources, land uses may be only seasonally restricted. For example, timber harvest may not be compatible in the vicinity of a bird nesting colony during the nesting season, but can be conducted in the vicinity of the colony when nesting birds are not present.

Ecological management is the most important component of natural area stewardship. Ecological management includes all activities on a natural area specifically intended to benefit, save, or maintain natural heritage resources. Examples of ecological management include prescribed burning, removal or planting of vegetation for habitat restoration, problem species control, and restoration of natural processes. Some natural heritage resources require intensive active management, while others require no or little active management.

Probably the two most common ecological management strategies that will benefit natural areas and natural heritage resources in the APES region are restoring natural processes such as fire and controlling invasive species. Fire has played a major role in the ecology of many plant communities in the coastal plain of Virginia. Many communities such as longleaf pine-turkey oak barrens, pocosins, and estuarine marshes require fire to stimulate flowering and seed production, enhance regeneration by exposing bare mineral soil, reduce shade and competition from woody overstory species, and release nutrients into the soil. Natural fires no longer sweep over vast expanses of Virginia's landscape and play the role they once did in maintaining these ecosystems. The reintroduction of fire as a prescribed management action is necessary. Ecological burning is intended to restore fire to its natural frequencies and time of year to simulate natural processes occurring in natural areas.

Invasive species are plants or animals which directly or indirectly

threaten the viability of natural heritage resources or have the potential to do so. Most invasive species are aliens. Alien species are those whose natural range does not include the coastal plain of Virginia, but which were intentionally or unintentionally introduced to the region by humans. Often these alien species become particularly invasive in disturbed areas. Examples of invasive species include common reed, Japanese honeysuckle, purple loosestrife and feral pigs. Some native species can also threaten natural heritage resources, especially in urban areas where nature's delicate balance has been disrupted. Beaver and white-tailed deer are examples of native species which can adversely affect natural heritage resources.

Stewardship also includes biological monitoring activities. Biological monitoring involves the periodic quantitative study of natural heritage resources and their environment. The purpose of biological monitoring is to furnish long term scientific data, to provide warnings as to any declines or damage to natural heritage resources, and to determine possible causes of such events. Additionally, biological monitoring may document increases in rare species populations and recovery of disturbed ecosystems. Monitoring visits usually also include some analysis of the status of invasive species and environmental conditions. Whether or not and how often a natural heritage resource is monitored is determined by its priority, sensitivity, and threats.

Stewardship should also address the need for additional biological inventory or scientific research. In many natural areas, the true status of the natural heritage resources is poorly known and the potential for additional natural heritage resources to be found has not been thoroughly examined. Additional biological inventory may be recommended for these situations. Some species, habitats, and natural communities are not well understood due to a lack of scientific research. Natural areas provide an excellent setting for field research which may not only increase the general knowledge of the natural heritage resources and sensitive ecosystems, but may also provide information directly pertinent to the site's conservation.

RECREATIONAL, SCENIC, AND EDUCATIONAL CONSIDERATIONS

Natural areas have uses other than the preservation of biodiversity. Depending upon the size and situation of the site and the sensitivity of the natural heritage resources it contains, a natural area may also furnish recreational, visual, and educational resources. Local governments can integrate natural areas into their comprehensive plans to improve the quality of life for residents and attract visitors.

The natural areas identified in this region may offer a variety of recreational opportunities. Public access to some of these areas could encourage the awareness of the natural resources and promote

their protection. Recreational opportunities may include nature observation, boating, canoeing, hiking, biking, and horseback riding. The natural areas may also contribute to greenspace either as designated greenways or open space. Existing recreational facilities could be identified along with the natural areas to form an extensive greenways system in the APES region. The concept of incorporating the natural areas into local comprehensive, open space, and parks and recreation plans should be encouraged to provide various levels of recognition and protection for the valuable natural and biological resources.

Natural areas often contribute to the scenic resources of an area. A preliminary visual assessment for each of the natural areas of the APES region should be conducted for the conservation and enhancement of scenic resources. These natural areas have a significant visual character which is typical of the environment early European settlers encountered upon arriving on the continent. The preservation of scenic resources is important to capture these historical perspectives of the early colonists as well as enhance the present perceptions of the environment.

The educational opportunities which the natural areas could offer are numerous. The focus of environmental education on the APES natural areas could include levels ranging from public awareness to scientific research. There may be additional opportunities to form linkages for educational and interpretive facilities which would create an entire system of natural area educational opportunities within the region. A coalition of public education representatives as well as educators and research scientists from surrounding institutions could facilitate such a system of educational opportunities in the area.

Preliminary recommendations regarding the recreational, scenic, and educational possibilities of each natural area are included in the site accounts. This information was provided by Janit Potter of the Department of Conservation and Recreation's Division of Planning and Recreation Resources.

RESULTS

Information collection and site visits for this project began in October of 1992 and were completed in February of 1994. Ecological boundaries and conservation planning recommendations were formulated for the natural areas through February of 1994.

The conservation planning boundaries and recommendations for protection and stewardship furnished in this document should not be interpreted as acquisition boundaries, proclamation boundaries, or regulatory land-use zones. Instead, the conservation planning boundaries and recommendations should be considered tools to help steer wise land use planning on the complex economic, social, and ecological landscape at all levels of government and the private sector.

The Virginia Department of Conservation and Recreation strongly urges the local governments to vigorously utilize all the conservation tools at their disposal to secure protection for their natural areas and provide for the long-term stewardship of the sites. The Department of Conservation and Recreation's commitment to natural areas conservation in the APES region does not end with the conclusion of this project. Project staff will continue to offer support to the local governments, developers, consultants, conservation organizations, and private citizens in the forms of environmental review, refined conservation planning, and active technical assistance with planning, protection, and stewardship of natural areas.

NATURAL AREA REPORTS

Each natural area report presented here includes information on the location, biodiversity rank, natural heritage resources, ecological boundaries, and surrounding land uses. Each site report includes a map indicating the primary and secondary ecological boundaries and text providing justification of these boundaries. Further, a general description of each natural area, protection and stewardship recommendations, and recreational, scenic, and educational considerations are included in each natural area account.

Primary and secondary ecological boundaries should not be interpreted as regulatory zones or acquisition boundaries, but as conservation tools to help guide the protection and stewardship of natural heritage resources.

Table 2 shows the format for the site accounts and explains the what data is presented in each field of information.

RESULTS FROM LANDOWNER CONTACT PROGRAM

The purpose of the landowner contact program for the APES natural areas was threefold:

1. to inform owners that their land is of high ecological significance;
2. to educate owners about the natural heritage resources, their characteristics, and threats; and,
3. to establish relationships with landowners so that additional contacts and stronger natural area protection strategies may be approached at a later date.

During this project, the owners of significant natural areas in the Albemarle-Pamlico region were contacted. Landowners were contacted for eight natural areas in this region. These sites were Antioch Swamp Pine Barrens, Blackwater River--Below Rt. 603, Cat Ponds, Disputanta, Northwest River--Upper Section, Northwest River--Smith Creek, Northwest River --Southwestern Marshes, and South Zuni Sandhills. These sites are located in the counties of Surry, Sussex, Isle of Wight, and Prince George and the City of Chesapeake.

Forty-three landowners with tracts at the eight natural areas mentioned above were contacted during the course of this project. Most of the natural area tracts (70%) were owned by private individuals. The remaining tracts were either in corporate ownership or in an estate.

The success rate of meeting with landowners after the initial contact letter or telephone call has been positive thus far. Only five landowners have declined the request to meet and discuss the natural area. Seven landowners have not been contacted since original introductory letter was mailed. This was due either to inadequate information locating the landowner or difficulty in reaching the owner at home. Meetings have taken place with landowners of more than half of the natural area tracts thus far. Meetings have been scheduled with the remaining six landowners.

Ninety percent of the landowners visited were interested in learning about the natural areas and the species and natural communities they support. A majority of these landowners had a genuine interest in learning about the species, and were proud that such rarities existed on their property. Five of the landowners expressed an interest in strong natural area protection and management such as conservation easements, management agreements, and acquisition. Seven landowners responded positively to the concept of placing their land on the natural area registry in the future.

A few landowners were interested in learning about the significance of their property, yet not sure about possibility of future

protection for various reasons. For example, one parcel is an estate controlled by nine family members and the likelihood of getting all the owners together and to agree to manage the area would be difficult. Another owner, the land manager of property under a trust fund, is interested in protection, but the property may not be under his management in next few years. Another parcel is deeded to heirs and the current owner is wary of imposing restrictions on the way the heirs may use the land in the future. Two of the owners seemed to have an indifferent attitude towards conservation. They listened to all of the information presented, but did not comment on it one way or the other.

The five landowners who declined a visit from the DCR Natural Area Protection Specialist did so for various reasons. One elderly landowner was interested in the information, but lives out of state and was concerned about traveling to Virginia to learn more. Another owner viewed his property solely as a means of producing income from timber production and had no interest in learning anything else about the natural values of their property. The remaining three landowners were quite antagonistic and defensive during telephone conversations. They obviously felt threatened, possibly in fear of possible land use restrictions due to presence of rare species or concern of being approached by a state agency.

At the time this report was written, no landowners had placed their property on the Virginia Registry of Natural Areas. However, as mentioned previously, several landowners have expressed interest in placing their land on the registry and it is expected that several landowners will do so in the future. During the first personal meeting with a landowner, the registry program was not mentioned unless the landowner showed a strong conservation interest or requested information on ways they could help conserve the species and communities of concern. A few landowners felt pressured when asked if they were interested in placing their natural area on the registry. Rather than endanger the possibility of a productive relationship with a landowner in the future, the issue was not pursued during the first personal visit.

Table 2. Key To Natural Area Report Format

LOCATION: the city or county and USGS 7.5' quadrangle in which the natural area occurs.

BIODIVERSITY RANK: the overall (global) significance of the natural area in terms of the rarity of the natural heritage resources and the quality of their occurrences. These ranks are explained in detail in the introduction to this report.

GENERAL DESCRIPTION: a brief narrative picture of the natural area. This section usually includes information on topography, general vegetation, wetlands and watercourses, soils, historic and existing land uses within the natural area, and land use surrounding the natural area.

NATURAL HERITAGE RESOURCES: a synopsis of the natural heritage resources found in the natural area. Information given usually includes common and scientific names, taxonomic affiliation, global and state ranks, global and state range, a brief physical description, habitat requirements, threats and vulnerabilities, and occurrence data. For the protection of the resources, precise locations are not provided. Normally, natural communities are discussed first, then key species are discussed.

PRIMARY ECOLOGICAL BOUNDARY: description and justification of the primary ecological boundary.

SECONDARY ECOLOGICAL BOUNDARY: description and justification of the secondary ecological boundary.

PRIMARY AND SECONDARY ACREAGE: the total size of the natural area in acres. Acreage given in the site accounts has been approximated using a hand-operated planimeter.

TRACTS: the number of individual ownership tracts within the primary and secondary ecological boundaries.

ONSITE AND OFFSITE CONSIDERATIONS: a discussion of current land use and general information regarding current zoning.

MANAGEMENT RECOMMENDATIONS: Recommendations include compatible and incompatible land uses, need for further inventory or scientific research, ecological management needs, and biological monitoring needs.

PROTECTION RECOMMENDATIONS: existing and proposed protection of the natural area. Information furnished includes existing regulations that protect the natural area, existing legal protection to the land, and suggestions for protection tools

appropriate for the natural area.

INFORMATION NEEDS: additional information needed to improve our ability to protect and manage each natural area.

RECREATIONAL, SCENIC, AND EDUCATIONAL CONSIDERATIONS: existing and potential recreational opportunities; preliminary assessment of scenic value; suggestions for appropriate educational activities. These comments were provided by Janit Potter of the Department of Conservation and Recreation's Division of Planning and Recreation Resources.

MAP: A map of each natural area showing the primary and secondary ecological boundaries accompanies each natural area report. U.S. Geologic Survey 7.5 minute topographic maps are used as base maps with the ecological boundaries superimposed upon them. The scale is 1:24,000 (1 inch = 2000 feet). A site map legend for the ecological boundary symbols used on the maps is presented below. Although the most current revisions available are used for base maps, many of the most recent developments are not depicted upon them. Because of the missing information on many of the base maps and their relatively large scale, a small margin for error may exist with many of the ecological boundaries. Fine tuning of the boundaries can be accomplished through field survey as necessary.


SITE MAP LEGEND:

Site (ecological) boundaries:

Primary: 

Secondary: 

Where Primary and Secondary Correspond: 

Managed Area boundary: 

AERIAL PHOTOGRAPH: A color infra-red aerial photograph of each natural area follows the site map. These photos were taken in the early 1980's. They have been included here to clearly illustrate land use, (forested, agricultural, residential, etc.), wetlands versus upland, and proximity of the natural area to other natural or developed lands.

BLACKWATER RIVER MACROSITE

Size: 25 miles (river corridor and floodplain)

Location: Virginia, Counties of Isle of Wight,
Southampton, Surry, Sussex

Overview:

The Blackwater River, part of the Chowan watershed in southeastern Virginia has its headwaters in Prince George County. It then winds through Surry, Sussex, Southampton and Isle of Wight Counties in Virginia, crosses the state line and joins the Nottoway River. The Blackwater and Nottoway Rivers merge with the Meherrin River, and together they become the Chowan River, which ultimately empties into the Albemarle Sound in North Carolina.

The Blackwater River is generally shallow with extensive swamps and a wide floodplain which supports a diverse spectrum of native flora and fauna. This river has been recommended as a State Scenic River and there is a great deal of interest in pursuing this designation. Currently, the Blackwater River is awaiting evaluation as a State Scenic River.

The Blackwater River Macrosite stretches for 25 miles along the river channel and floodplain. From Route 603 in Surry County, also called "Three Bridges" to the Route 603 bridge in Isle of Wight County, five conservation sites and a variety of natural heritage resources have been identified (see Table 1). Two of the five sites include the river channel and associated swamp, and the remaining three sites are located on lands adjacent to the river. Five rare fish species and three rare mussels are found in the river along this particular stretch, with one fish, the Blackbanded Sunfish, Enneacanthus chaetodon listed as state endangered. The Blackwater Ecologic Preserve, a managed area owned by Old Dominion University is contiguous with two of the latter conservation sites. A joint conservation effort to protect this portion of the river and floodplain, as well as the identified conservation sites would serve many rare species of plants and animals, and unique vegetative communities.

The conservation sites that include the river channel have been identified as exemplary bottomland forests and are believed to be globally significant. These two sites have several State-champion trees and cypress-tupelo swamps marked by 600 year old cypress trees. Acquisition and landowner agreements have been

recommended, and begun for the lands associated with these two sites.

The three sites located on lands adjacent to the Blackwater River support rare vegetative communities. These communities are comprised of rare plant species which are fire-dependent and are consequently in great peril. Some of these species are at the edge of their distribution in addition to representing exemplary communities. Acquisition and landowner/ management agreements are recommended, and have also begun for the lands associated with these three sites.

Locality description:

Four localities and two planning districts are incorporated into this unique corridor of natural resources. The counties involved are Isle of Wight, Southampton, Surry and Sussex. Surry and Sussex Counties are located within Planning District No. 19, the Crater Planning District; and Isle of Wight and Southampton Counties are located within Planning District No. 23, the Hampton Roads Planning District.

Although all four counties recognize the value of rivers, floodplains and wetlands as natural resources, county planners, officials and citizens must be informed of the State and National significance of these particular conservation sites and the importance of preserving the integrity of the Blackwater River.

Threats:

Residents of these four counties obtain their water primarily from wells, although there are several withdrawal locations near the city of Franklin, in Southampton County. Increased withdrawals could adversely affect the hydrology of the river, degrading it and ultimately jeopardizing it's many uses.

Another major threat to this watershed is agricultural and urban non-point source pollution. The Division of Soil and Water Conservation has rated this particular watershed as high priority in the state for agricultural non-point source concerns. Increased development in the area will lead to increased urban run-off and pollution, further endangering the Blackwater River and its associated flora and fauna. Carefully planned, responsible development should be strongly encouraged in these critical areas.

Recommendations:

The necessity of cooperative conservation planning becomes evident when examining this macrosite. It is recommended that joint

efforts be undertaken between planning districts, localities, conservation organizations, state agencies and local citizen's groups and private citizens. An example of joint community, state and private group action to protect a river corridor is the Saco River Corridor Commission in Maine. This commission has been extremely successful; it incorporates 20 Maine municipalities, was approved by the state legislature in 1973 and has been in effect for over 20 years.

Pursuing Scenic River designation will heighten recognition of this significant resource. Focusing protection efforts on the key conservation sites will provide an anchor for expanded protection and stewardship work along the river. Innovative landowner incentive programs such as the Department of Conservation and Recreation's Registry of Natural Areas Program, the Partners in Wildlife Program and the Forest Stewardship Program will increase our capability to reach many landowners and develop model land-use plans.

In Virginia, the Blackwater River, it's floodplain and associated lands support a rich array of plants and animals. Many of these species are rare or threatened and are in critical periods in their respective natural histories. Protection of the Blackwater River Macrosite is a worthy endeavor. Progressive foresight on the part of county and regional planners, municipalities, agencies, conservation organizations, citizens groups, and private landowners could make a substantial contribution to the preservation of one of Virginia's finest centers of biological diversity.

Table 1. List of Natural Heritage Resources: Blackwater River Macrosite.

COMMON Name	SCIENTIFIC Name	State Rank	State Status	Global Rank
COMMUNITIES				
Eutrophic semi-permanently flooded forest		S3	-	-
Oligotrophic woodland		S1	-	-
Oligotrophic forest		S1	-	-
PLANTS				
Dwarf paw-paw	<u>Asimina parviflora</u>	S2	-	G5
Sweet shrub	<u>Calycanthus floridus</u>	S2	-	G5T4T5
Sandy-woods chaffhead	<u>Carphephorus bellidifolius</u>	S1	-	G4
Wooly chaffhead	<u>Carphephorus tomentosus</u>	S1	-	G4
Coast sandbur	<u>Cenchrus carolinianus</u>	S2	-	G5
Pineland tick-trefoil	<u>Desmodium strictum</u>	S2	-	G3G4
Cottony golden-aster	<u>Heterotheca gossypina</u>	S1	-	G5
Pine barren rush	<u>Juncus abortivus</u>	S1	-	G4G5
Sheep-laurel	<u>Kalmia angustifolia</u>	S2S3	-	G5
Long-leaf pine	<u>Pinus palustris</u>	S1	-	G4G5
White-fringe orchid	<u>Platanthera blephariglottis</u>	S2	-	G4
October-flower	<u>Polygonella polygama</u>	S1	-	G4
Flowering pixie-moss	<u>Pyxidanthra barbulata</u>	S1	-	G4
Blue-jack oak	<u>Quercus incana</u>	S2	-	G5
Turkey oak	<u>Quercus laevis</u>	S2	-	G5
Sand post oak	<u>Quercus margarettae</u>	S2	-	G5
Fasciculate beakrush	<u>Rhynchospora fascicularis</u>	S2	-	G5
Coast rose-gentian	<u>Sabatia calycina</u>	S1S2	-	G3G5
Northern pitcher plant	<u>Sarracenia purpurea</u>	S2	-	G5
Seymeria	<u>Seymeria cassioides</u>	S1S2	-	G5
White blue-eyed grass	<u>Sisyrinchium albidum</u>	S1	-	G?
Narrow leaved bluecurls	<u>Trichostema setaceum</u>	S2	-	G5
Creeping blueberry	<u>Vaccinium crassifolium</u>	S1	-	G4G5
Carolina yellow-eyed grass	<u>Xyris caroliniana</u>	S1	-	G4G5
Viperina	<u>Zornia bracteata</u>	S1	-	G5
ANIMALS				
Mud sunfish	<u>Acantharchus pomotis</u>	S3	-	G5
Mabee's salamander	<u>Ambystoma mabeei</u>	S1	LT	G4
Swampfish	<u>Chologaster cornuta</u>	S3	-	G5
Blackbanded sunfish	<u>Enneacanthus chaetodon</u>	S1	LE	G5
Lake chubsucker	<u>Erimyzon sucetta</u>	S2	-	G5
Lined topminnow	<u>Fundulus lineolatus</u>	S1	-	G5
Eastern lampmussel	<u>Lampsilis radiata</u>	S2	-	G5
Tidewater mucket	<u>Leptodea ochrachea</u>	S3	-	G4
Eastern pondmussel	<u>Ligumia nasuta</u>	S3	-	G4
Southeastern crowned snake	<u>Tantilla coronata</u>	S2	-	G5

ANTIOCH SWAMP PINE BARRENS

LOCATION: Virginia, Isle of Wight County
Quadrangle: Zuni Quadrangle code: 3607677

BIODIVERSITY RANK: B2

DIRECTIONS:

The site is located south of Antioch Swamp, east of the Blackwater River, and north of the Blackwater Ecological Preserve.

GENERAL DESCRIPTION:

The site supports a large, A-ranked occurrence of an old growth loblolly pine forest, and is one of the finest remaining stands of this type in Virginia. In addition to the significant community found at this site, Antioch Swamp Pine Barrens also supports 3 rare oak species. With additional zoological inventory it is very likely that rare insects or other unusual invertebrates for Virginia will be discovered.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	G / S Rank	EO Rank	Fed / State Status
communities:				
Oligotrophic forest		S1	A	- -
plants:				
<u>Quercus incana</u>	blue jack oak	G5 S2	D	- -
<u>Quercus laevis</u>	turkey oak	G5 S2	AB	- -
<u>Quercus margarettae</u>	sand post oak	G5 S2	AB	- -

This oligotrophic forest consists of over 100 acres of old growth loblolly pine forest supported by dry sandy soils. At least 3 rare oak species are found here, turkey oak (Quercus laevis), sand post oak (Quercus margarettae), and blue jack oak (Quercus incana). These unique fire-dependent plants and the soils supporting them indicate a vegetative community known as a "pine-barren". Soils here are primarily Alaga fine sand and Chipley sand; both are characterized as being very deep, well drained soils with low natural fertility, low organic matter content and low available water capacity (Kitchel et al., 1982). Included with these soils is Nawny loam which is most often associated with the floodplains and drainages. The area is north of, and adjacent to the Blackwater Ecologic Preserve. Protection of Antioch Swamp Pine Barrens would result in a large, contiguous, diverse natural area which supports rare vegetative communities, plants and animals.

Fire has played a major role in creating and maintaining the unique combination of plant species at this site. The area has

not burned in several decades though, and consequently the fire-dependent species are reproducing poorly. Appropriate fire management is desperately needed to preserve these resources.

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the oligotrophic forest and rare plant species. The main purpose of the primary ecological boundary is to delineate and encompass known occurrences of natural heritage resources, and existing and potential habitat for those resources. Inclusion of minimal buffers provides excellent restoration potential for rare species with active management.

On the north and west sides of the site, the primary boundary is the upland/wetland interface and adheres to the contours of Antioch Swamp, and on the east side, it follows Britt Run, a small stream. The southeastern primary boundary follows a small dirt road. The primary and secondary boundaries coincide on the southern, southeastern, and southwestern sides of the site. The boundary along the southern edge of the site is contiguous with the Blackwater Ecologic Preserve.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the oligotrophic forest, rare plant species, and potential habitat for additional rarities. Fire management is crucial to the preservation and maintenance of the unique community and rare plant species at this site. Because the primary purpose of the secondary ecological boundary is to include lands intended to mitigate natural and human threats to the resources and their habitats, and to include lands related to special management needs, this boundary was drawn with special consideration given to the potential natural and existing firebreaks and lands needed for this future active management of protected lands.

On the northern, western, eastern, and southeastern sides of this site, the secondary boundary extends minimally to include Antioch Swamp and Britt Run. Inclusion of the swamp and additional drainages provides natural firebreaks for future management. The secondary ecological boundary continues southward linking Antioch Swamp Pine Barrens with the Blackwater Ecologic Preserve and Horse Swamp Pine Barrens. This site and the others are integral parts of a larger sandhill ecosystem. For the sake of consistency with the APES inventory report, they have been described separately.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 300 acres

Secondary acreage (acreage within secondary ecological boundary)- 48 acres

Total acreage recommended for protection- 348 acres

TRACTS:

Number of ownership tracts within site: four.

Number of ownership tracts within the primary ecological boundary: one. One tract, representing one landowner makes up the entire area within the primary ecological boundary of the Antioch Swamp site.

ONSITE AND OFFSITE CONSIDERATIONS:

Much of the land within the primary ecological boundary is managed as corporate timber land and is leased to a private hunt club which assists with road maintenance and security. Land use surrounding this site is primarily agricultural and silvicultural, though this site is adjacent to the Blackwater Ecological Preserve which is owned and managed by Old Dominion University.

Residential or industrial development in the area are serious offsite considerations which may influence future management activities related to developing fire and smoke management programs.

This area lies entirely within Isle of Wight County. In the county comprehensive plan, the Blackwater River and Antioch Swamp floodplains are designated Resource Management Areas. This designation carries the following developmental and agricultural recommendations designed to protect the natural resources (Isle of Wight County Comprehensive Plan, 1991).

- No development be permitted on slopes exceeding 25% where soils are unsuitable.
- Development in floodplains should be limited and responsibly managed.
- Clearing of woodlands and forests should be minimized to the extent possible.
- In general, only very limited low density residential development should be permitted in those areas of the Resource Conservation District which are developable.
- When development does occur in the Resource Conservation District, all environmental impacts should attempt to be avoided and in cases where impacts do occur, mitigation measures should be employed.
- The State and private conservation organizations should actively pursue programs to purchase and/or acquire easements for privately owned lands in the Resource Conservation District so they can be preserved.

MANAGEMENT RECOMMENDATIONS:

Fire has played a major role in creating and maintaining the unique

vegetation at this site, although the area has not burned in recent years. Once protection is secured, a fire management plan should be developed for the barrens. The rare species populations will be enhanced through prescribed burning. The site's proximity to the Blackwater Ecologic Preserve allows for the creation of a larger and more viable preserve, and increased habitat for many rare species. Managers of the Blackwater Ecologic Preserve possess the technical and scientific expertise needed to manage pine barrens, and a coordinated management strategy is recommended for these two sites.

PROTECTION RECOMMENDATIONS:

Acquisition, or voluntary landowner protection is recommended for land within the primary and secondary ecological boundaries. Landowner contact is currently underway in this area. Access and management agreements on much of this land are critical to the future active management of this site.

If this site is protected as a natural area, administrative and managerial access might be best accomplished in coordination with the efforts at the Blackwater Ecologic Preserve.

Antioch Swamp Pine Barrens is north of and adjacent to Blackwater Ecologic Preserve. Another site recommended for protection, Horse Swamp Pine Barrens is located just south of the preserve. Together, these areas support many rare species and exceptional communities and represent an important priority for the conservation of Virginia biological diversity. The proximity of these sites to the Blackwater Ecologic Preserve and the restoration potential for additional rarities makes this area, and specifically this site, extremely important.

INFORMATION NEEDS:

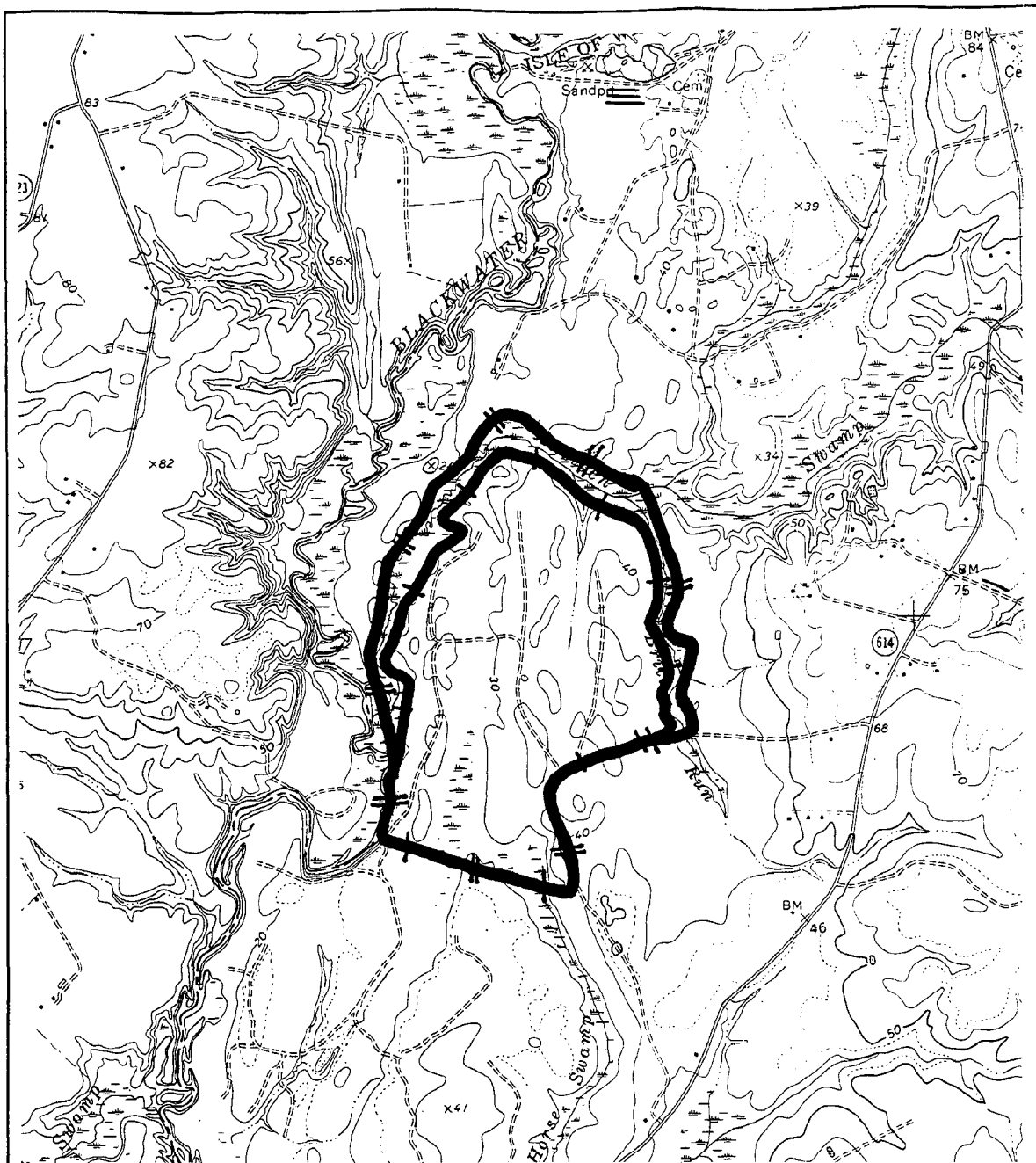
More vertebrate and invertebrate inventories of this site are needed. Further inventories of this area will likely reveal additional rarities.

Additional information concerning protection status and future plans for the adjacent significant lands would be extremely helpful in making comprehensive conservation planning decisions.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that Isle of Wight County:

- Provide an educational program which focuses on natural resources within the area.
- Make local developers and businesses aware of the natural resource issues which are relevant to the area and encourage them to consider these issues in future planning activities.



SITE NAME: ANTIOCH SWAMP BARRENS
USGS 7.5' QUADRANGLE: ZUNI
SCALE: 1:24,000



BLACKWATER RIVER - BELOW ROUTE 603

LOCATION: Virginia, Surry County and Sussex County
Quadrangle: Dendron Quadrangle code: 3707618

BIODIVERSITY RANK: B2

DIRECTIONS:

From Wakefield on Route 460, take Route 603 north for 7 miles to the Blackwater River "triple bridges". Proceed by canoe down the river to the site.

GENERAL DESCRIPTION:

This forested swamp along the Blackwater River is significant because it has more pristine bald cypress (Taxodium distichum) and water tupelo (Nyssa aquatica) vegetation than any other area in Virginia. It may be one of the nation's premier old growth swamps. Canopy trees are consistently over 30 meters tall for a distance of two miles along the Blackwater River. The presence of water tupelo in this swamp may indicate a rich nutrient base, as these trees are thought to be more common in bald cypress habitats with higher water and nutrient flow (Ewel and Odum, 1984). Soils found in the Blackwater River floodplain are primarily Mattan mucky silty clay loam. These soils are characteristic of freshwater swamps and basins (Hodges, 1993). The cypress-tupelo swamp shows only occasional signs of disturbance from logging, and much of it could be characterized as virgin forest (Rawinski and Ludwig, 1992).

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
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communities:

Eutrophic Semipermanently

Flooded Forest	cypress swamp	-	S3	A	-	-
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This site supports Virginia's finest cypress swamp, according to Mr. Gary Williamson who is a respected authority on wetlands of this type. Some of the larger cypress trees at this site along the Blackwater River are 180 to 200 cm in diameter, and consequently, are estimated to be at least 600 years old. The bald cypress has an existing range that is limited primarily to the humid Southern and Southwestern bottomlands. It can be found only as far north as southern Delaware and Maryland, and extends southward through the Coastal Plain to extreme south Florida. To the west, bald cypress ranges through south-central Texas and northward in the Mississippi Valley as far as southeastern Missouri, southern Illinois and southwestern Indiana. In Virginia, bald cypress is found only in the southeastern region and within a narrow corridor stretching along the eastern edge of the State (Dennis, 1988).

The site encompasses an existing state natural area, The Charles C. Steirly Natural Area which is owned by the Commonwealth and managed by the Department of Conservation and Recreation to protect a nesting site for the Great Blue Heron. The natural area consists of 19 acres located on the southern side of the western reach of the Blackwater River in Sussex County. There are historic records of both Great Blue Herons and American Egrets using this area as a nesting site. Recent observations by Department of Conservation and Recreation personnel indicate that the viability of this heronry may be in question. Although a few remnant nests were seen, it appears that current nesting activity is occurring downstream from the former nesting site and that at best, a small heronry may still be active at the state natural area.

PRIMARY ECOLOGICAL BOUNDARY:

The primary boundary encompasses the full extent of the existing cypress-tupelo swamp forest. The principle purpose of the primary ecological boundary is to delineate and encompass all known occurrences of the natural heritage resources and their existing and potential habitats. For this reason, the primary boundary is drawn to include all of the forested wetlands in the immediate area.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary boundary includes the cypress-tupelo swamp with minimal buffers of forested upland and several critical drainages. The principle purpose of the secondary ecological boundary is to include lands and water intended to mitigate natural and human threats to the resources and their habitats, and to include lands related to special management needs. Minimal buffer lands of several small drainages and some upland forests have been included within this secondary boundary. In general, buffers around the forested swamp are 150 feet. This distance, prescribed as the 1.5 X tree height, "rule of thumb", (Rawinski, 1993) should help mitigate effects from surrounding land uses. In addition, the upland buffer will help protect the ancient trees from wind-throw damage, water quality degradation, and changes in light penetration which could ultimately allow the invasion of alien plant species and aggressive competitors. The secondary boundary is expanded around heron nesting sites, and around areas that were identified as critical drainages.

Inclusion of several small drainages within the secondary ecological boundary aid in protecting the river from perturbations to the natural flooding regime. The boundary on the east side encompasses four of these small drainages, and the boundary on the west end of the site includes three such areas. The secondary boundary at the northeastern corner of the swamp includes a drainage up to, but excluding an impoundment. The maintenance of the natural water levels and flow are crucial to the health of the swamp and to the use of heron nesting sites. Organic material is disseminated by the river's naturally unhurried flow; and proper

water levels impact waterbird nesting by regulating vegetational growth and health of existing trees, and by exerting some predator control.

Along the southwestern reach of the Blackwater River the secondary boundary is approximately 1000 feet from the C. C. Steirly Natural Area and from general locations identified as active nesting areas. This allows the prescribed buffer of approximately 1000 feet around the heronry which should not only adequately protect the birds from disturbance, but should also allow for some expansion of the nesting areas (Buckley and Buckley, 1976). Great Blue Herons are particularly sensitive while nesting and rearing chicks; reproductive success depends largely upon minimal disturbance during this crucial time.

The secondary boundaries have an added advantage of providing visual and noise buffers for people seeking a natural recreational or educational experience in this premiere cypress-tupelo swamp. Upland acreage to the south of the swamp has been included to provide for site access, security and educational interpretation.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within the primary ecological boundary)- 359 acres.

Secondary acreage (acreage within the secondary ecological boundary)- 503 acres.

Total acreage suggested for protection - 862 acres.

TRACTS:

Number of ownership tracts within site: thirteen. Thirteen tracts representing ten different landowners surround this site. Number of ownership tracts within the primary ecological boundary : eight.

ONSITE AND OFFSITE CONSIDERATIONS:

The character of the surrounding lands is predominantly rural. Current activities are primarily timber management and agriculture. Current farming practices do not appear to be a threat to these particular natural heritage resources at this time. Future logging of the adjacent uplands could result in an increased susceptibility to wind damage, increased sediment flow or the spread of exotic species. Changes in water quality or flow could drastically affect the existing vegetation within the swamp.

The hydrologic regime of the Blackwater River and associated tributaries appears in tact. Although some of this cypress-tupelo swamp has been selectively logged in the past, it currently stands relatively undisturbed. Some uplands included in the secondary ecological boundaries have been intensively logged and are in early growth pine plantation. Intentions of the present landowners are not known, therefore, future logging and development should be determined.

Sussex County relies on ground water and surface water from the

Nottoway River to supply it's residents, and the Blackwater River floodplain is described as a "conservation district" in the county comprehensive plan. This designation offers no specific protection through regulatory restrictions, however activities in this area receive close scrutiny by local planners.

Residents of Surry County rely on ground water and on surface water from the Blackwater River. The major point of removal appears to be near the town of Dendron, which is several miles downstream from this forested swamp site. The Blackwater River floodplain is designated a "conservation district" in the county comprehensive plan, and although this designation is not accompanied by any regulatory restrictions, activities in this area receive close scrutiny by local planners. The county comprehensive plan states that Surry County officials are actively pursuing a plan to promote tourism in their county which is rich with historical assets. Nature tourism, or eco-tourism of outstanding natural resources would seem to be an excellent compliment to this endeavor.

Local planning officials in both Surry and Sussex Counties should be made aware of the ecological significance of this natural area. The Department of Conservation and Recreation, other natural resource agencies and conservation organizations, and localities should work on strategies to protect water quality and hydrologic regimes along critical drainages and mainstem of the Blackwater River.

The best way to tour this site is by canoe. Canoeists should be warned however, that the river is strewn with sunken logs and that caution should be exercised when traveling through this area.

MANAGEMENT RECOMMENDATIONS:

No active vegetation management is needed, but the general health and vitality of the forest should be monitored to permit early detection of perturbations. The natural heritage resources at this site require long-term biological monitoring. The Department of Conservation and Recreation has staff with expertise in designing monitoring plans and in conducting long term biological studies of this type.

Abandonment and relocation of the heron nesting colony may have resulted from local disturbances. Seasonal restriction of access around the nesting sites and long-term protection and monitoring of these sites should be initiated to prevent future disruption of the nesting herons.

PROTECTION RECOMMENDATIONS:

Acquisition and/or landowner agreements are recommended for all land included within the primary ecological boundary. Protection of critical drainages on the north, east and west sides of the swamp may best be accomplished through landowner contact, and consequently, conservation easements, management agreements or

natural area registry agreements.

The Charles C. Steirly Natural Area is partially contained within the primary ecological boundary and completely contained within the secondary ecological boundary. Currently this area is managed by the Chippokes Plantation State Park to protect the heronry. The presence of this natural area further enhances the importance of protecting this Blackwater River site below the Route 603 bridge.

Although this site is similar to Blackwater River above Route 620, this site is distinguished by a slightly less dense cypress stand. This conservation site lies approximately 15 miles upstream from the other Blackwater River conservation site. In this area, the Blackwater River serves as the county line and thus incorporates four localities in these two sites. All counties involved, Isle of Wight, Southampton, Surry and Sussex recognize the need to preserve and protect floodplains, wetlands and natural resources. Perhaps a cooperative conservation effort could ultimately protect large stretches of this river in addition to the specific sites identified by these reports. The nature of the swamp and the inherent qualities which prohibit its development also allow the river and floodplain to serve as a corridor for wildlife. Certainly, protection of as much of this floodplain as possible would be an ultimate goal.

These conservation sites are represent two of the most important components of a much larger natural area, the Blackwater River watershed, or Macrosite. These two sites have been described separately within this report, but comprehensive conservation planning should take into account the boundaries presented in the Blackwater River Macrosite report.

INFORMATION NEEDS:

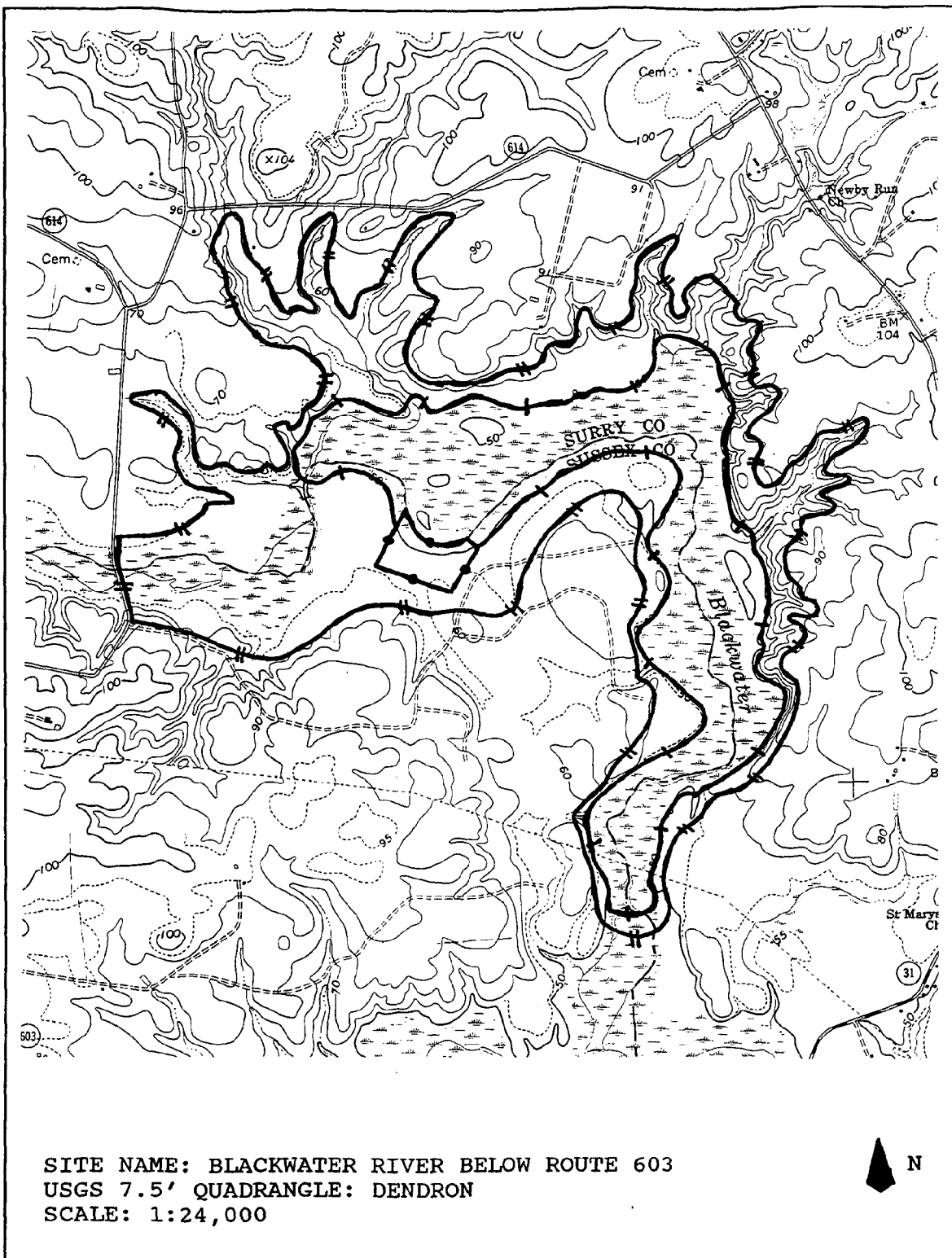
Information concerning the foraging habits of waterbirds using the nesting colony would be useful in establishing future protection plans for the area.

Information concerning long-range water supply needs and plans for both Surry and Sussex Counties would be needed for future management planning for this site.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that the respective counties:

- Provide an educational program which focuses on natural resources within the area.
- Make local developers and businesses aware of the natural resource issues which are relevant to the area and to consider these issues when making planning decisions.



BLACKWATER RIVER - ABOVE ROUTE 620

LOCATION: Virginia, Isle of Wight County and Southampton County
Quadrangle: Raynor Quadrangle code: 3607687

BIODIVERSITY RANK: B2

DIRECTIONS:

Blackwater River - north of Route 620. Route 460 East, north onto Route 620 at Ivor, several miles before crossing the river. Site is approximately 2.5 - 3 miles north of Zuni along the Blackwater River.

GENERAL DESCRIPTION:

This site encompasses a four-mile riparian corridor along the Blackwater River. It supports one of the Nation's premiere old growth cypress-tupelo swamps, with a large expanse of bald cypress (Taxodium distichum) and water tupelo (Nyssa aquatica) bottomland forest. Four state-champion trees are found at this site, including Virginia's largest bald cypress. Soils found in the Blackwater River floodplain within this area are primarily Nawney loam (Kitchel, 1985). The site is comparable to the Blackwater River site located below Route 603, however this site supports a denser stand of cypress as well as State-champion trees. Both areas are nationally significant because they contain such fine examples of old growth cypress swamp.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
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communities:

Eutrophic Semipermanently

Flooded Forest	cypress swamp	-	S3	A	-	-
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This site supports an excellent example of a cypress-tupelo swamp forest, a nutrient-rich forest with standing water most of the year. After a survey of bottomland forests by Mr. Gary Williamson, a respected authority on wetland forest vegetation, it was evident that this swamp is one of the two best in the state. Some of the larger cypress at this site are two meters or more in diameter, and consequently, are estimated to be at least 600 years old.

Bald cypress has an existing range that is limited primarily to the humid southern and southwestern bottomlands. It can be found only as far north as southern Delaware and Maryland, and extends southward through the coastal plain to extreme south Florida. To the west, bald cypress ranges through south-central Texas and northward in the Mississippi Valley as far as southeastern Missouri, southern Illinois and southwestern Indiana. In Virginia,

bald cypress is found only in the southeastern portion of the state and within a narrow corridor stretching along the eastern edge of the state (Dennis, 1988).

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the full extent of the cypress-tupelo swamp forest. The map convention for the primary ecological boundary is a solid line with single-crosshatches.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the eutrophic semi-permanently flooded forest, minimal upland buffers and several critical drainages. The map convention for the secondary ecological boundary is a solid line with double-crosshatches.

In general, minimal buffers around the forested swamp are 200 feet. This distance, prescribed as the 2.0 X tree height "rule of thumb", will help mitigate effects from surrounding land uses and excessive wind-throw (Rawinski, pers. com., 1993). Damage from wind-throw is a threat on all floodplains (Wharton, 1978), but a severe threat to this swamp because of the underlying soils. Naway loam is characterized as being deep, poorly drained, only moderately permeable and as having a minimal slope of 0-2% (Kitchel, et al. 1982). The characteristics of this soil and the size of the trees combine to make wind-throw a considerable threat to this old growth swamp. Additionally, the upland buffer will help protect the ancient trees from water quality degradation and changes in light penetration which could ultimately allow the invasion of alien plant and animal species.

Inclusion of several small drainages within the secondary ecological boundary should serve the purpose of protecting the river from perturbations to the natural flooding regime. The boundary on the east side encompasses three of these small drainages. The boundary for one of the drainages on the east side is below the gas pipelines located along the river. On the west side, the boundary includes five drainages. The maintenance of the natural water levels and flow are crucial to the health of the swamp. In addition to disseminating organic material, the natural hydrologic regime also plays a small role in excluding alien plant species.

The secondary boundaries offer an added advantage of providing visual and noise buffers for people seeking a natural recreational or educational experience in this exemplary old growth cypress swamp.

A corridor of upland area has been included in the northwest portion of the site to provide access. This strip follows a stream which runs from Route 617 to the Blackwater River. The area should be sufficient for administrative, managerial and interpretive access.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 828 acres.

Secondary acreage (acreage within secondary ecological boundary)- 490 acres.

Total acreage recommended for protection- 1318 acres.

TRACTS:

Number of ownership tracts within site: twenty one. These tracts are owned by 14 different landowners.

Number of ownership tracts within the primary ecological boundary: eighteen.

ONSITE AND OFFSITE CONSIDERATIONS:

The character of the surrounding lands is predominantly rural. Current activities are primarily timber management, row cropping and pig farming. Current farming practices do not appear to be a threat to these particular natural heritage resources. Some of the adjacent uplands were logged recently. If logging activities continue in the area, greater upland/wetland buffers are recommended to mitigate wind damage, altered light regimes, the spread of exotic plants and increased sediment loads to the wetland system. Forested upland buffers will help maintain a defensible old growth swamp and allow for continued forestry and agricultural activities.

The hydrologic regime of the Blackwater River and associated tributaries appears to be relatively intact. Although some of this forested swamp has been selectively logged in the past, the remainder currently stands primarily undisturbed. Some uplands included in the secondary ecological boundary have been intensively logged in the past and are in early growth pine plantation. The entire east side of the site is owned by a paper/lumber company, and since intentions of these and other present landowners are unknown, continued logging and development should be considered imminent threats.

Isle of Wight County, which makes up the north and northeastern portions of this site, relies on ground water to supply it's residents. The Blackwater River floodplain is designated a "Resource Protection Area", and a "Resource Management Area", designations which carry several developmental restrictions. In the County Comprehensive Plan, county planners appear to take an aggressive conservation stance in the protection of existing natural resources, and the Blackwater River floodplain receives the same land-use designation as the James River. Although this floodplain doesn't fall under the protection umbrella of the Chesapeake Bay Preservation Act and Regulations, the nearby James River and it's tributaries are included. County Comprehensive Plan recommendations that apply to the Blackwater River floodplain are: development within the floodplain is limited; clearing should be minimized; only low density residential development will be allowed

where soils permit; when development occurs, environmental impacts should be avoided, and when impossible, mitigation measures should be employed; and finally, State and private conservation organizations should actively pursue programs to purchase and/or acquire easements for privately owned lands in these districts so they can be preserved. The Floodplain Management Ordinance for Isle of Wight County is in compliance with the Federal Emergency Management Agency, and is also sensitive to the preservation of the floodplains as natural resources as well.

Residents of Southampton County which constitutes the western and southwestern portions of this site, rely on ground water for their water needs. The Blackwater River floodplain is designated a "major swamp or flood hazard area". There are no restrictions that protect these areas, however the County Comprehensive plan states, "the scenic and recreational value of the County's waterways and wetlands should be protected and promoted for use by County residents and recreational visitors from outside the County". The plan goes further to say that "new residential subdivision activity will be discouraged from occurring in the County's floodplains and more remote rural areas".

This site can be toured by canoe during the seasons of high water. Canoeists should be warned however, that the river is strewn with submerged logs and that caution should be exercised when traveling through this area.

MANAGEMENT RECOMMENDATIONS:

No active vegetational management of this site is needed, but the general health and vitality of the forest should be monitored to permit early detection of perturbations.

PROTECTION RECOMMENDATIONS:

This site represents one of the most significant and awe-inspiring natural areas in Virginia. It is an ecological treasure worthy of long-term protection and stewardship.

Acquisition and/or voluntary landowner protection is recommended for all land included within the primary ecological boundary. Protection of critical drainages on the east and west sides of the swamp may best be accomplished through landowner contact, and consequently, conservation easements, management agreements or registries.

Although this site is similar to the other Blackwater River site (Blackwater River Below Route 603), it is distinguished by a denser cypress stand, and the occurrence of several state champion trees. This conservation site lies approximately 15 miles downstream from the other Blackwater River conservation site. In this area, the Blackwater River serves as the county line and thus incorporates four localities in these two sites. All counties involved, Isle of Wight, Southampton, Surry and Sussex recognize the need to preserve

and protect floodplains, wetlands and natural resources. Perhaps a cooperative conservation effort could ultimately protect large stretches, if not all, of this river in addition to the specific sites identified by these reports. The nature of the swamp and the inherent qualities which prohibit it's development also allow the river and floodplain to serve as a corridor for wildlife. Certainly, protection of as much of this floodplain as possible would be an ultimate goal.

These conservation sites are two of the most important components of a much larger natural area, the Blackwater River watershed, or macrosite. They have been described separately to remain consistent with the APES report, but comprehensive conservation planning should take into account the boundaries described in the Blackwater River Macrosite report.

Local planning officials in both Isle of Wight and Southampton Counties should be made aware of the ecological significance of this natural area. The Department of Conservation and Recreation, other natural resource agencies and conservation organizations, and localities should work on strategies to protect water quality and hydrologic regimes along critical drainages and the mainstem of the Blackwater River.

INFORMATION NEEDS:

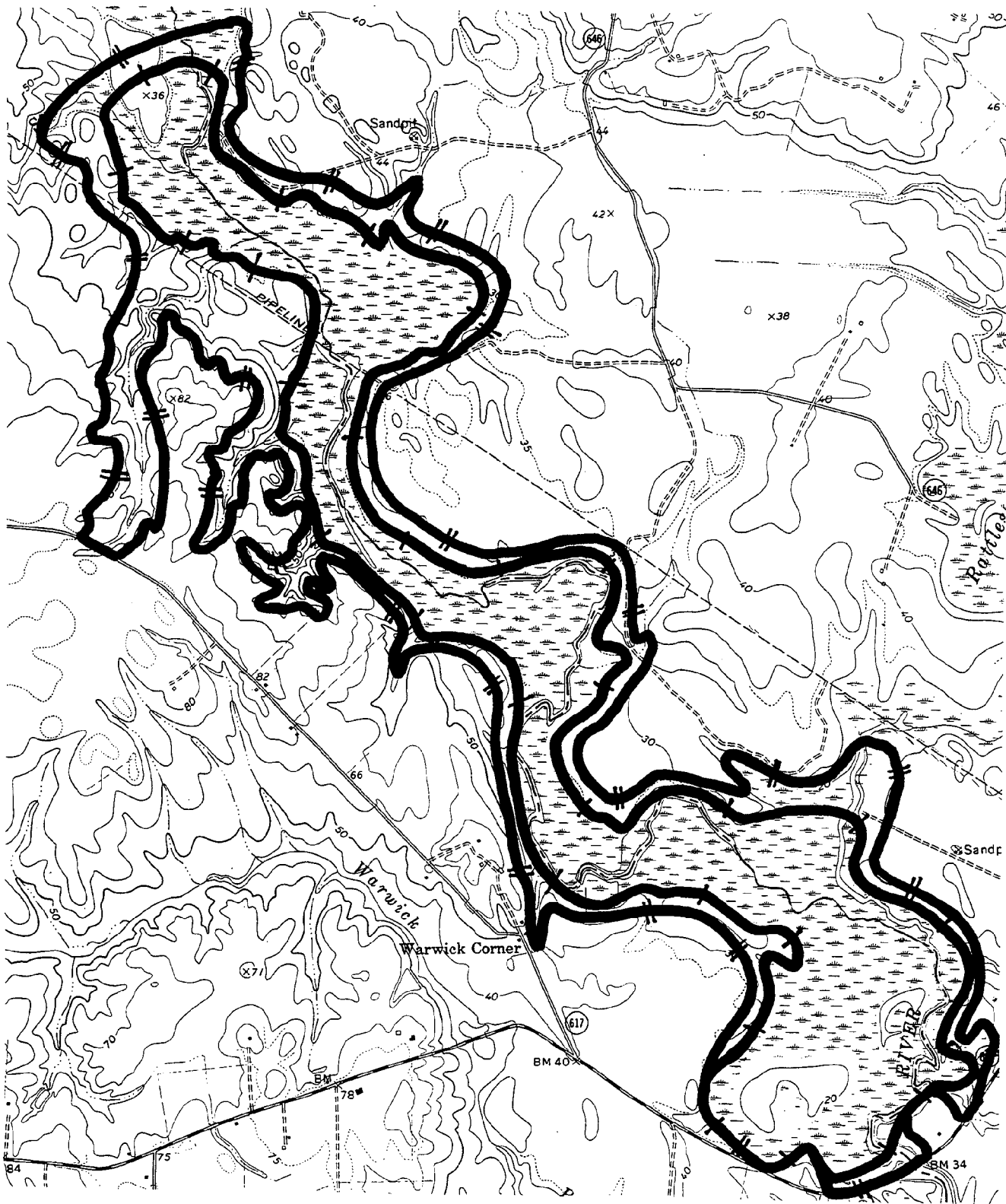
Information concerning long-range water supply needs and plans for both Isle of Wight and Southampton Counties would be needed for future management planning for this site.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that the respective counties:

- Provide an educational program which focuses on natural resources within the area.

- Make local developers and businesses aware of the natural resource issues which are relevant to the area, and encourage them to consider these issues when making future development plans.



SITE NAME: BLACKWATER RIVER ABOVE ROUTE 620
USGS 7.5' QUADRANGLE: RAYNOR
SCALE: 1:24,000



SOUTH ZUNI SANDHILLS

LOCATION: Virginia, Isle of Wight County
 Quadrangle: Zuni Quadrangle code: 3607677

BIODIVERSITY RANK: B4

DIRECTIONS:

The site is located south of Zuni, north of Antioch Swamp, east of the Blackwater River, and west of Route 614.

GENERAL DESCRIPTION:

This site supports a rare vegetative community and five rare plant species. In the woodlands are found an unusually high number of oak species, three of which are rare in Virginia.

This site and other conservation sites nearby are integral parts of a larger sandhill ecosystem.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
communities:						
Oligotrophic woodland	turkey oak sandhill	-	S1	C	-	-
plants:						
<u>Asimina parviflora</u>	dwarf paw-paw	G5	S2	CD	-	-
<u>Desmodium strictum</u>	pineland tick-trefoil	G2G4	S2	BC	-	-
<u>Quercus incana</u>	blue jack oak	G5	S2	BC	-	-
<u>Quercus laevis</u>	turkey oak	G5	S2	AB	-	-
<u>Quercus margarettae</u>	sand post oak	G5	S2	AB	-	-

This oligotrophic woodland is a remnant of once a large expanse of xeric sandhill vegetation. At least three rare oak species are found here: turkey oak (Quercus laevis), sand post oak (Quercus margarettae), and blue jack oak (Quercus incana). These fire-dependent plants and the soils that support them compose a vegetative community unique to the state. Soils here are primarily Alaga fine sand, Leon Chipley sands and Kinston loam; characterized as being very deep, well drained soils with low natural fertility, low organic matter content and low available water capacity (Kitchel et al., 1982).

Many of the rare species found here are fire dependent plants, therefore, fire has played a major role in creating and maintaining this plant community. The area has not burned in many years though, and many of these plants are reproducing poorly. The South Zuni Sandhills site is in great need of prescribed burning to restore the quality of the sandhill vegetation and the rare oaks.

South Zuni Sandhills is very close to the Antioch Swamp Pine Barrens site. The protection and appropriate management of these two areas would represent a significant contribution to the

conservation of one of Virginia's rarest vegetation types. This effort would complement the protection work underway at the nearby Blackwater Ecological Reserve which supports many rare species of plants and animals.

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the rare sandhill vegetation and rare plant occurrences. The main purpose of the primary ecological boundary is to delineate and encompass known occurrences of natural heritage resources and existing and potential habitat for those resources. Minimal buffers included here represent excellent restoration potential for rare species with active management.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary encompasses the turkey oak sandhill vegetation, rare plant occurrences, and a small amount of additional land which serves as buffer. Because the secondary ecological boundary is meant to mitigate for natural and human threats to the resources and their habitats, and to provide lands related to special management needs (such as prescribed fire), only minimal buffer lands are needed. As much as possible, through the use of maps and aerial photographs, ecological boundaries were drawn to exclude existing residences and agricultural fields. The site is bordered on the east/southeast and southern sides by Antioch Swamp and one of its tributaries. The secondary ecological boundary continues southward linking South Zuni Sandhills with Antioch Swamp Pine Barrens, the Blackwater Ecologic Preserve and Horse Swamp Pine Barrens.

The primary ecological boundary coincides with the secondary ecological boundary except on the northern and western edges of the site. Where the two boundaries do not coincide, the buffer is extremely narrow (approximately 75 feet) to allow for managerial access.

This site and the others are integral parts of a larger sandhill ecosystem. For the sake of consistency with the APES inventory report, they have been described separately.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 134 acres
Secondary acreage (acreage within secondary ecological boundary)- 17 acres
Total acreage recommended for protection- 151 acres

TRACTS:

Number of ownership tracts within site: thirteen.

Number of ownership tracts within the primary ecological boundary: thirteen.

ONSITE AND OFFSITE CONSIDERATIONS:

Land use surrounding this site is primarily agricultural, residential and forestal. Some of the land identified within the primary ecological boundary is actually, much the same, residential or rural. Although the ecological boundaries were drawn to exclude developed lands as much as possible, the site is intertwined with houses, pastures, agricultural fields and timber tracts.

Clear-cutting, and large scale timbering will significantly degrade the natural character of the woodland vegetation, especially if followed by herbicide treatments and pine plantations.

This area lies entirely within Isle of Wight County. In the county comprehensive plan, the Blackwater River (to the west of this site) and Antioch Swamp floodplains (bordering the southeast and southern edges of this site) are designated Resource Management Areas. This designation carries the following developmental and agricultural recommendations designed to protect the county's natural resources (Isle of Wight County Comprehensive Plan, 1991).

- No development be permitted on slopes exceeding 25% where soils are unsuitable.
- Development in floodplains should be limited and responsibly managed.
- Clearing of woodlands and forests should be minimized to the extent possible.
- In general, only very limited low density residential development should be permitted in those areas of the Resource Conservation District which are developable.
- When development does occur in the Resource Conservation District, all environmental impacts should attempt to be avoided and in cases where impacts do occur, mitigation measures should be employed.
- The State and private conservation organizations should actively pursue programs to purchase and/or acquire easements for privately owned lands in the Resource Conservation District so they can be preserved.

Residential or industrial development of nearby, undisturbed tracts is a serious offsite consideration which may influence future management activities related to developing fire and smoke management programs.

The southern edge of the South Zuni Sandhills site lies at the edge of Antioch Swamp. The swamp is the northern edge of another site recommended for protection, Antioch Swamp Pine Barrens, which is adjacent to Blackwater Ecologic Preserve. If protected, these sites would be separated only by the width of Antioch Swamp. Because the swamp is designated a Resource Management Area and extensive development is improbable, the protection of this site, and the nearby Antioch Swamp Pine Barrens would significantly increase the area and defensibility of a contiguous natural area which already supports many rarities and has tremendous restoration potential for still others.

MANAGEMENT RECOMMENDATIONS:

Fire has played a major role in creating and maintaining the unique vegetation at this site, although the area has not burned in recent years. Once protection is secured, a fire management plan should be developed. The rare species populations will be enhanced through prescribed burning.

PROTECTION RECOMMENDATIONS:

This site is a mosaic within a small residential community, therefore, protection of this site should be achieved primarily through means other than acquisition. Landowner notification is recommended, and is ongoing. Additions to the Department of Conservation and Recreation's Natural Areas Registry Program are currently under consideration. One landowner, contacted at the time of the survey is currently enrolled in the Forest Stewardship program. Landowners should be informed of the significance of the existing natural heritage resource element occurrences, and should be encouraged, where possible to manage potential habitat appropriately.

No administrative access would be necessary for this site, however managerial access to critical areas would be a crucial part of management agreements with individual landowners.

INFORMATION NEEDS:

Further inventory of this natural area may reveal additional rarities; vertebrate and invertebrate inventories are needed.

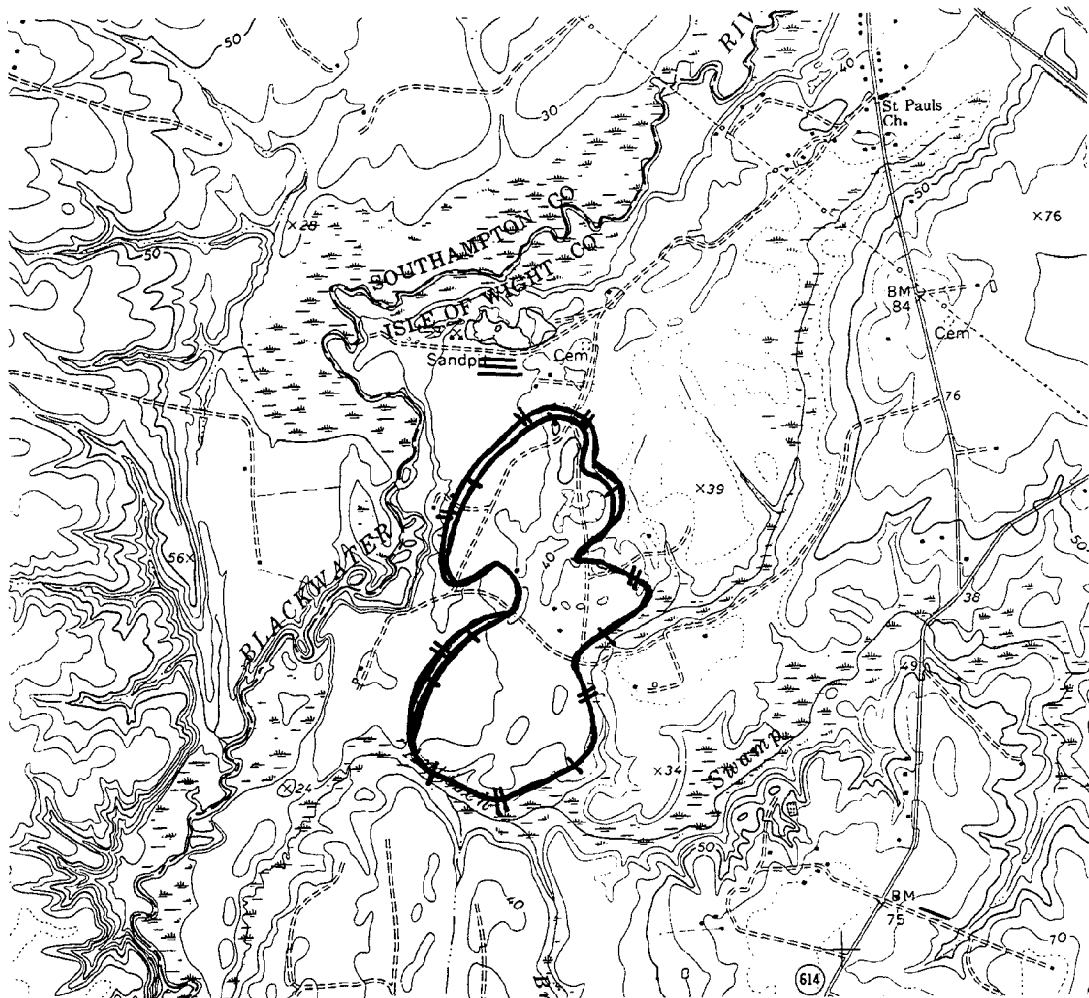
Protection status and future plans of the significant nearby lands would be extremely helpful.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that Isle of Wight County:

- Provide an educational program which focuses on natural resources within the area.

- Make local developers and businesses aware of the natural resource issues which are relevant to the area and encourage them to consider these issues in future planning activities.



SITE NAME: SOUTH ZUNI SANDHILLS
USGS 7.5' QUADRANGLE: ZUNI
SCALE: 1:24,000



HORSE SWAMP PINE BARRENS

LOCATION: Virginia, Isle of Wight County
 Quadrangle: Zuni Quadrangle code: 3607677

BIODIVERSITY RANK: B2

DIRECTIONS:

From Zuni, take Route 460 east one mile. Right on Route 645, and one mile to Route 614 - three miles on Route 614. All sites within the Zuni Macrosite are east of the Blackwater River and within 1.5 miles of the river channel. The general area runs from Route 603 north to 0.7 miles north of Zuni. This site is located east of the Blackwater River, and just east of the junction of Route 603 and Route 614.

GENERAL DESCRIPTION:

This site supports very rare, fire-dependent long-leaf pine and turkey oak vegetation. This particular assemblage of rare plants and vegetation types is extremely rare in Virginia. Because of widespread destruction throughout its range, long-leaf pine - turkey oak vegetation should be considered globally rare.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
communities:						
Oligotrophic woodland	pine barren	-	S1	C	-	-
plants:						
<u>Carphephorus bellidifolius</u>	sandy-woods chaffhead	G4	S1	D	-	-
<u>Kalmia angustifolia</u>	sheep-laurel	G5	S2S3	A	-	-
<u>Pinus palustris</u>	long-leaf pine	G4G5	S2	CD	-	-
<u>Pyxidanthera barbulata</u>	flowering pixie-moss	G4	S1	C	-	-
<u>Quercus laevis</u>	turkey oak	G5	S2	AB	-	-
<u>Quercus margarettae</u>	sand post oak	G5	S2	AB	-	-
<u>Vaccinium crassifolium</u>	creeping blueberry	G4G5	S1	D	-	-

The site contains an extremely rare type of oligotrophic forest characterized by long-leaf pine (Pinus palustris) and turkey oak (Quercus laevis). Long-leaf pine and understory plants such as creeping blueberry (Vaccinium crassifolium), flowering pixie-moss (Pyxidanthera barbulata), and sheep-laurel (Kalmia angustifolia) indicate a fire-maintained vegetation type sometimes called "pine barren". Soils here are primarily Alaga fine sand and Chipley sand; both are considered to be deep, well drained soils with low natural fertility, low organic matter content and low available water capacity (Kitchel et al., 1982).

Horse Swamp Pine Barrens is at the northern range limit of long-leaf pine and perhaps because of the soils and climate, the site lacks a number of southern plant species which are typical of this community type in the center of its range. Department of Conservation and Recreation ecologists regard this community as globally endangered, as an overwhelming percentage of this forest type has been decimated through development or converted to other uses.

Horse Swamp Pine Barrens is in very close proximity to the Blackwater Ecologic Preserve which supports similar rare vegetation and many of the same rare plant species. The protection of the Horse Swamp Pine Barrens would represent a significant contribution to the conservation of Virginia's biological diversity and greatly complement the conservation efforts at the Blackwater Ecological Preserve.

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the rare pine barren vegetation and some critical adjoining lands. The main purpose of the primary ecological boundary is to delineate and encompass known occurrences of natural heritage resources and existing and potential habitat for those resources. Inclusion of minimal buffer lands provide excellent restoration potential for rare species with active management. The northern and southern edges are bordered by roads, and the eastern side is bordered by another small stream and agricultural fields. On the western edge of the site, the inclusion of a small stream should serve as an excellent natural firebreak for future management activities.

SECONDARY ECOLOGICAL BOUNDARY: The secondary ecological boundary includes the rare community, rare species occurrences and some additional lands to serve as buffer. The secondary ecological boundary is designed to include lands for mitigation of natural and human threats, and to provide lands related to special administrative or managerial needs, such as prescribed fire management. Because fire management is crucial to the preservation and maintenance of this distinctive community and the rarities supported here, the secondary ecological boundary includes several small streams, drainages and minimal additional lands to serve as natural and existing fire breaks.

The secondary ecological boundary reaches east and drops south of the primary on the eastern and southeastern sides of the site; this encompasses some of the agricultural fields located along Route 603. Portions of these fields will be crucial in future management for administrative access and as fire breaks.

The secondary ecological boundary continues northward, and separated only by a rural, secondary road, it links Horse Swamp Pine Barrens with the Blackwater Ecologic Preserve, Antioch Swamp Pine Barrens and South Zuni Sandhills. This site and the others

are integral parts of a larger sandhill ecosystem. For the sake of consistency with the APES inventory report, they have been described separately.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 156 acres
Secondary acreage (acreage within secondary ecological boundary)- 86 acres
Total acreage recommended for protection- 242 acres

TRACTS:

Number of ownership tracts within site: six. This site includes six parcels of land representing five different landowners.
Number of ownership tracts within the primary ecological boundary: six.

ONSITE AND OFFSITE CONSIDERATIONS:

This area is managed primarily for timber, and parts of the site have been selectively logged and clearcut. Surrounding land use is timber or agriculture, and there is a large working farm to the east and southeast of the site.

Lack of fire poses a serious threat to this natural area. Because this community has been created and maintained by fire, many of the rare plants here are reproducing poorly. Prescribed burning is recommended to enhance the rare species populations. As fires create open soil habitats, the number of rare plant species here will likely increase dramatically. Virtually all of the rare plant species found at the Blackwater Ecologic Preserve and other nearby significant lands should be expected to colonize the Horse Swamp Pine Barrens site following prescribed burning. Lowland areas within the pine barrens currently support sphagnous thickets of pond pine (Pinus serotina), laurel-leaf greenbriar (Smilax laurifolia), and sweetbay magnolia (Magnolia virginiana). With fire, these wet areas would be converted to open, bog-like environments and exceptional rare plant habitat.

Future logging likely could degrade this natural community and its rare plant populations. Residential or industrial development in the nearby surrounding area may pose a threat to future management activities related to developing future fire and smoke management programs.

This area lies entirely within Isle of Wight County. The county comprehensive plan designates Horse Swamp as a Resource Management Area (Bradby, 1991). Horse Swamp is the easternmost border of the Blackwater Ecologic Preserve before it crosses Route 614 and serves as a border for this site along the northern and western sides. The designation of Resource Management Area is designed to protect the natural resources, and carries the following recommendations for development and agricultural uses.

- No development be permitted on slopes exceeding 25% where soils are unsuitable.
- Development in floodplains should be limited and responsibly managed.
- Clearing of woodlands and forests should be minimized to the extent possible.
- In general, only very limited low density residential development should be permitted in those areas of the Resource Conservation District which are developable.
- When development does occur in the Resource Conservation District, all environmental impacts should attempt to be avoided and in cases where impacts do occur, mitigation measures should be employed.
- The State and private conservation organizations should actively pursue programs to purchase and/or acquire easements for privately owned lands in the Resource Conservation District so they can be preserved.

MANAGEMENT RECOMMENDATIONS:

It is recommended that a fire management plan be developed for this area. Managers of the Blackwater River Ecologic Preserve possess the technical and scientific expertise needed to manage pine barrens. If protected, Horse Swamp Pine Barrens could be efficiently managed through a cooperative effort with the Blackwater Ecologic Preserve.

PROTECTION RECOMMENDATIONS:

Acquisition of some of the land within the primary and secondary ecological boundaries is recommended. An old logging road from Route 614 into this tract could provide access. Secondary access might be considered on the southern portion of the site, by acquiring small portions of land along the road.

The combination of appropriate management, and proximity to the Blackwater Ecologic Preserve and additional significant lands, gives this site excellent restoration potential for additional rarities, and offers the possibility of a large, diverse, contiguous and defensible natural area preserve. It is among the highest protection priorities in southeastern Virginia.

Horse Swamp, which runs along the northern and western sides of the site, and a stream located on the east side of the site have been included within the primary and secondary ecological boundaries. Although these wetlands are not necessary for the maintenance of the natural resources, they are crucial for future management as natural fire breaks. The inclusion of a portion of the agricultural fields should also serve as a good fire break, as well

as assuring future access to the site for management purposes. Lands within the secondary boundary alone need not be acquired as long as access and management rights are secured for the future active management of protected lands.

INFORMATION NEEDS:

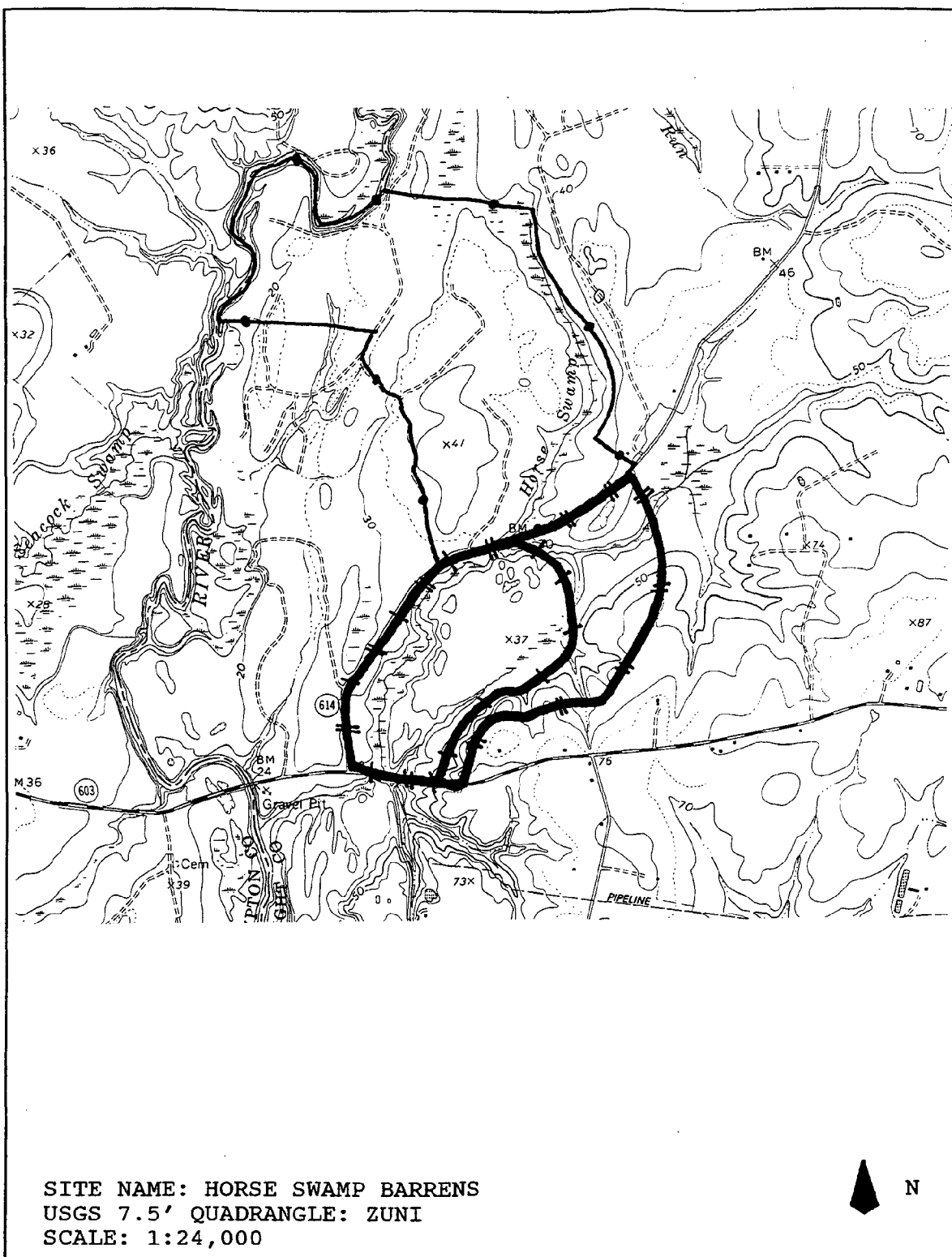
More vertebrate and invertebrate inventories of this site are needed, as well as further exploration of the entire tract. Further inventories here could yield the discovery of more rarities.

It would be useful to know the status and future land use plans of the nearby lands which support rare plant species.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that Isle of Wight County:

- Provide an educational program which focuses on natural resources within the area.
- Make local developers and businesses aware of the natural resource issues which are relevant to the area and encourage them to consider these issues in future planning activities.



CAT PONDS

LOCATION: Virginia, Isle of Wight County
 Quadrangle: Benns Church Quadrangle code: 3607685

BIODIVERSITY RANK: B4

DIRECTIONS:

Cat Ponds is clearly named on the USGS topographic map and is located approximately one mile northwest of Wills Corner in the area north of Route 600, east of Route 602, and west of Route 10.

GENERAL DESCRIPTION:

This site was first made known to scientists in 1938 by Harvard botanist M. L. Fernald. At that time, these ephemeral sinkhole ponds were pristine and supported a great variety of rare plants (Fernald, 1938). Since Fernald's time, many developments have occurred around these ponds, although the ponds still support two ecologically unique communities and several rare species of plants and animals. Though the natural integrity of the ponds and surrounding drainage has been compromised, Cat Ponds remains an area of biological significance.

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
communities:						
buttonbush-maidencane community		G3	S1	C	-	-
Coastal plain sinkhole pond		G4	S1	A	-	-
plants:						
<u>Eleocharis melanocarpa</u>	black-fruited spikerush	G4	S2	BC	-	-
<u>Eleocharis tricostata</u>	three-angle spikerush	G4	S1	D	-	-
<u>Ludwigia brevipes</u>	long beach seedbox	G4G5	S2	D	-	-
<u>Panicum hemitomon</u>	maidencane	G5	S1	A	-	-
animals:						
<u>Ambystoma mabeei</u>	Mabee's salamander	G4	S1	C	-	LT
<u>Ambystoma tigrinum</u>	eastern tiger salamander	G5	S1	C	-	LE
<u>Attilides halesus</u>	great purple hairstreak	G5	S3	C	-	-
<u>Siren intermedia</u>	lesser siren	G5	SU	B	-	-

The ponds at this site are formed in sinkhole basins. These basins form when the limy beds in the underlying soils are leached by groundwater and the overlying sediments subside or collapse suddenly into the void created by dissolution. The sinkholes originally form as shallow depressions on the otherwise level plain, and increase in depth and areal extent as more underlying lime is dissolved. In the Early Phase of development, the depressions are too shallow and too small to hold water for very long. In the Middle Phase of development, the depressions characteristically are larger, and deep enough now to collect and

retain water for variable periods of time. As the depressions continue to increase in size, the basins eventually coalesce, and compound sinkholes form. Many of these 'merged' sinkholes contain ponds in the shape of a figure-eight. The sinkholes eventually fill with sediment (in the Late Phase of development) and are breached by eroding streams. Most sinkholes in the Cat Ponds area are in the Middle Phase of development.

The sinkhole ponds here range in age from 80,000 to more than 100,000 years old. The pond-bottom sediments of the older ponds often contain extensive fossil pollen records. Studies of fossil pollens can reveal important clues about climate, vegetation, and fire history of the prehistoric past. As might be expected, older ponds usually have thicker layers of accumulated bottom sediments than do younger ponds. These sediments actually retard water loss and these ponds will hold water for longer periods of time than similar-sized ponds with thinner bottom sediments (Clark, 1993; Rawinski, pers. comm.).

The hydrology of sinkhole ponds is influenced by groundwater and surfacewater interactions. A tremendous amount of infiltration and downward percolation occur here, with little lateral movement of groundwater, due to the especially porous nature of this area's geology and a lack of topographic relief. Water seeping downward is captured in a perched water table (an aquifer close to the surface separated from the deeper groundwater aquifers by an impermeable layer). During the wet seasons (late winter through early spring) rainfall percolates down to the perched aquifer. The filled aquifer then retards further downward movement of water. Flat topography discourages fast runoff and the filled, perched water table retards quick percolation, rainwater then finds its way into the sinkhole depressions forming seasonal ponds (Clark, 1993).

Most ponds fill in the winter and spring and lose water to evaporation and percolation through late spring and summer. They are usually dry by late summer or early fall. The decrease of each pond's water level depends upon the demographics of each pond (e.g. age, size, depth, location and vegetation). Individual pond hydrology is further influenced by varying amounts of annual precipitation. Natural water level fluctuations maintain open or semi-open forest canopies and help create diverse zones of vegetation on pond margins and bottoms. Since fish cannot survive in these seasonal ponds, the ponds provide predator-free breeding habitat for many amphibians.

Because of many variables affecting hydrology, each pond has a unique hydrologic regime which may vary annually. Most of the ponds are beneath a closed forest canopy, although some ponds that are larger or that retain more water, have less canopy cover, resulting in well-developed shrub and herbaceous layers. For these reasons, larger, deeper ponds will generally be more biologically diverse than smaller ponds. When this variability among ponds is

multiplied by the large number of ponds, it is clear that the Cat Ponds site supports an extremely diverse complex of isolated freshwater depression wetlands.

Although there have historically been many sinkhole ponds in Virginia, because of degradation and outright destruction there are very few pond complexes which still support native vegetation and/or rare species of plants and animals. The sinkhole ponds occurring at the Cat Ponds site are the deepest and largest coastal plain sinkhole ponds in Virginia (Buhlmann, 1992). Maintenance of these ephemeral sinkhole ponds and associated flora and fauna is extremely important.

Two plant species considered to be quite rare in Virginia are the three-angle spikerush (Eleocharis tricostata) and maidencane (Panicum hemitomon). In Virginia, three-angle spike rush is known from only five locations, and maidencane is known from only four. Both plants are characteristically found at pond edges in relatively shallow water, and they are considered to be quite "faithful to the sinkhole pond and Carolina Bay habitat" (Ludwig, pers. comm., 1993).

The Cat Ponds site also supports breeding populations of two rare salamander species, the eastern tiger salamander (Ambystoma tigrinum), which is state listed as endangered, and Mabee's salamander (Ambystoma mabeei), state listed as threatened. These species are generally found in small fish-less ponds (because fish will readily eat the juveniles, or larvae of the salamanders, they are rarely found in locations with naturally occurring or stocked fish populations).

Although tiger salamanders spend the larval period in the water, most of the adult period is spent on land, in terrestrial burrows. The terrestrial habitat for the eastern tiger salamander is usually described as a substrate which is suitable for burrowing or sandy areas near shallow ponds. Large range movements (approx. 175 m from breeding ponds) have been documented for these animals (Pague and Buhlmann, 1991).

Like the tiger salamander, Mabee's salamander spends its larval period in an aquatic environment and remains primarily terrestrial throughout its adult period. Little is known about the natural history of this animal; it is believed that they remain in the general vicinity of the breeding ponds, although normal range movements are thought to be comparable to those of the tiger salamander (Pague and Mitchell, 1991).

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses several groups of seasonal ponds and a powerline right-of-way. Ecologically significant areas designated by the primary ecological boundaries actually flank a sand-mining operation which is located in the

middle of the three areas. The delineated areas are located to the northwest, northeast and south of the mining activity. Clusters to the northwest and south contain several sinkhole ponds which support rare vegetation and amphibians. The area to the northeast of the site contains several similar ponds as well as the power line right-of-way from which the great purple hairstreak was collected.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the three areas identified by primary ecological boundaries, as well as lands intended as buffers to protect these sensitive ponds and the species they support. A naturally vegetated buffer of approximately 260 meters is suggested for protection of the ponds and rare salamanders (Pague and Buhlmann, 1991). Buffers to these ponds are imperative as aquifer recharge areas, for the protection of water quality, and for providing terrestrial habitat for rare amphibians. Although more information is needed on terrestrial habitat requirements for these rare amphibians, both the tiger salamander and Mabee's salamander spend their adult periods on land, and are known to travel fairly large distances for normal activities.

The secondary ecological boundary roughly follows the pipeline right-of-way and a secondary road on the northeast and north. On the western and southwestern edges the boundary follows the land contour and then crosses the powerline right-of-way. The secondary ecological boundary then rounds the southern tip of the site and generally follows the land contours up the eastern edge. Additional land is included here for protection of recharge areas and to mitigate natural and human threats to the normal hydrologic regime of these ephemeral sinkhole ponds. The boundaries will be continually refined as more information about this complex hydrologic system is gathered.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 84 acres.

Secondary acreage (acreage within secondary ecological boundary)- 346 acres.

Total acreage recommended for protection- 430 acres.

TRACTS:

Number of ownership tracts within site: nine.

Number of ownership tracts within the primary ecological boundary: Six tracts, representing six different landowners make up this site.

ONSITE AND OFFSITE CONSIDERATIONS:

The surrounding land uses at the Cat Ponds site are primarily agriculture, silviculture, and mining. A large sand-mining operation is located in the center of the conservation site. Much

of the land has been altered in relation to the mining activities, timbering activities or as a result of the increasing amount of residential development in this county (Clampitt, 1989). The population and associated services within Isle of Wight County are growing and expanding very rapidly.

The most severe threats to the sinkhole pond complex at Cat Ponds are hydrologic perturbations or interruptions. Disruptions of recharge areas, nearby water withdrawals and other hydrologic altering activities are grave threats to the continued existence of these ponds.

Exotic species do not appear to be a large threat at this time, although landowners need to be warned against stocking these ponds with fish that may pose threats to the rare plant and animal species supported here.

Some offsite considerations include nutrient enrichment from nearby agricultural lands, and sedimentation and other run-off from new housing developments. In the center of the secondary ecological boundary, and surrounded by small islands distinguished by primary ecological boundaries is a sand-mining operation. Several of the original ponds have succumbed to filling and associated problems with sedimentation from this activity. Cat Ponds site is located at the junction of two powerlines, and just south of the junction of two pipelines. There is an electric power substation located between two of the 'pond clusters' and the area is surrounded by agricultural and timbering activities; "outside", or alternate land use pressures are obviously quite intense.

MANAGEMENT RECOMMENDATIONS:

Management agreements for power line construction and right-of-way maintenance need to be discussed with VA Power. It should be stressed that right-of-way maintenance and power lines need to be manually or physically maintained instead of spraying with chemicals. Buffer strips of natural vegetation should be re-established around the ponds and also in areas of high run-off potential. A small dike constructed at the outlet of one of the ponds should be fortified and monitored to ensure protection against drainage of that particular pond.

Research on the hydrology of this sinkhole pond complex is necessary to understand conservation and future management considerations.

PROTECTION RECOMMENDATIONS:

Acquisition is not recommended for any of the land at the Cat Ponds site. The large amount of disruption and human alteration make the long-term viability of this site questionable. A large sand-mining operation is located in close proximity to the ponds identified by primary ecological boundaries, and is within the secondary ecological boundary. It is suggested that management agreements be

sought with appropriate landowners concerning the ponds and nearby land management and land use activities.

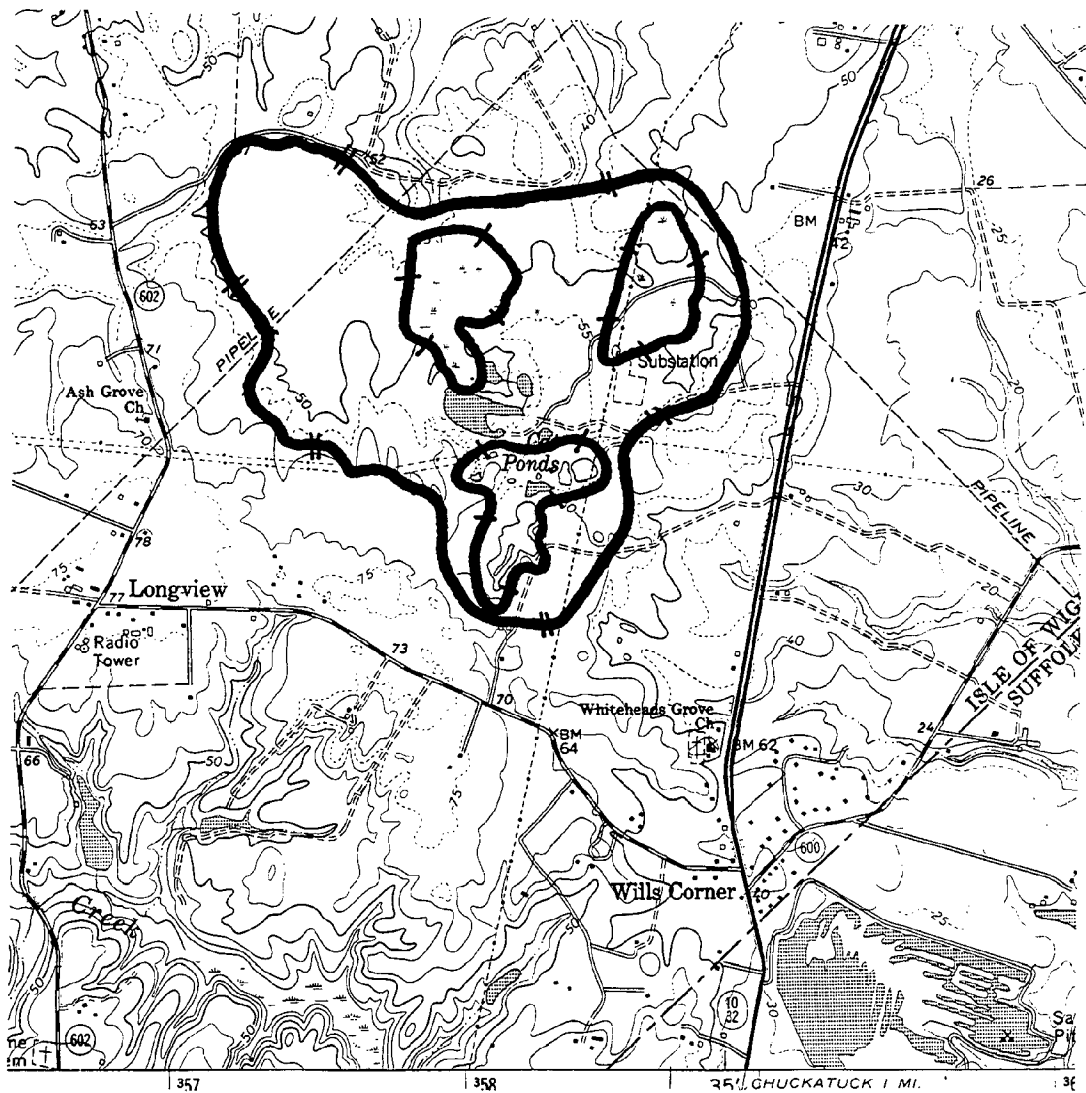
INFORMATION NEEDS:

Additional zoological inventory is needed here. Biological monitoring of these seasonal ponds and the rare plant and animal species is recommended once site protection is achieved.

Additional information is needed on the terrestrial habitat needs of the rare amphibians found at the Cat Ponds site.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that Isle of Wight County provide an educational program which focuses on natural resources within the area, and on local natural resource and environmental issues.



SITE NAME: CAT PONDS
 USGS 7.5' QUADRANGLE: BENNS CHURCH
 SCALE: 1:24,000



DISPUTANTA

LOCATION: Virginia, Prince George County

Quadrangle: Disputanta North Quadrangle code: 3707722

BIODIVERSITY RANK: B2

DIRECTIONS:

The site is located at the headwaters of Otterdam Swamp along Hines Road (Route 625) approximately one mile southwest of Lebanon Church.

GENERAL DESCRIPTION:

This rare plant site was discovered by noted Harvard botanist, M.L. Fernald in the 1930's. The sun-facing sunflower has continued to survive at this site since the original discovery to the present. The site consists of the right-of-way of Hines Road, along a 3/4 mile stretch of the road. The Disputanta site provides habitat for Virginia's only known population of the globally-rare, sun-facing coneflower (Rudbeckia heliopsidis). The highest number of plants is found on the north, northwest side of Route 625, although there are scattered plants on the southeast side of the road as well. Cut-over pine-oak flatwoods and pine plantations surround the site.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
plants:						
<u>Rudbeckia heliopsidis</u>	sun-facing coneflower	G2	S1	B	C2	C
<u>Sphagnum trinitense</u>	trinidad peatmoss	G4	S2S3	U	-	-
animals:						
<u>Libellula flavaida</u>	yellow-sided skimmer	G5	S2	C	-	-

The habitat of the sun-facing coneflower is the seasonally inundated and organic soils that exist over a clay-rich substratum. This area includes the headwater seep that forms Otterdam Creek. The herbaceous vegetation at the site is very diverse with 72 species noted by Wright (1989). At the southern end of this site is a small seasonal pond which supports the rare trinidad peatmoss (Sphagnum trinitense) and a rare dragonfly (Libellula flavaida). Cut-over pine-oak flatwoods and pine plantations surround the site.

The sun-facing coneflower (Rudbeckia heliopsidis) is a globally rare plant, and is a Category 2 species for possible federal listing as an endangered or threatened species. The coneflower is a southeast endemic of coastal plain and piedmont areas, and is

known from only 7 to 10 locations world-wide. It occurs in Virginia, North Carolina, South Carolina, Georgia and Alabama (Ormes, 1987). The Disputanta location in Prince George County is the only known Virginia occurrence of this rare species.

This attractive sunflower is similar in appearance to the common black-eyed susan, however as its name implies, the head and flower of this plant migrate to positions which face the sun. The sun-facing coneflower is a perennial herb which flowers in mid-summer and ripens its fruits in late summer to early fall (Ware, 1991). The species apparently reproduces both sexually and vegetatively, although, as is often the case with rare plants, much still needs to be determined about the life history. The sun-facing coneflower appears to require moist, acidic soils with high levels of sunlight (Ware, 1991).

The Virginia population of the sun-facing coneflower currently seems fairly healthy, though its habitat has become more, probably due to fire suppression in the past fifty years. When surveyed in the late 1980's, there were approximately 400 flowering plants and an additional 215 rosettes (Wright, 1989), with an extensive ground cover of young sun-facing coneflowers.

This plant is a poor competitor with woody vegetation and the maintenance of an opening within the habitat is imperative to the preservation of this population.

A combination of seasonally high water and some frequency of prescribed or wild fire are critical factors influencing the open character of this habitat. Other man-made disturbances such as log staging and road side maintenance practices have contributed to creating openings where this plant persists.

The swale at the southern end of the Disputanta site evidently is seasonally flooded, and serves as habitat for trinidad peatmoss, found at only several locations in Virginia; and for the yellow-sided skimmer, a dragonfly which is rare in Virginia. The occurrences of these three rare species and the respective status of each one make this site extremely worthy of protection efforts.

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the known occurrences of all three natural heritage resources as well as the existing and potential habitats. The primary ecological boundary follows Route 625 fairly closely, although it widens some to encircle the seasonal pond at the southern end of the site. The primary boundary also widens on each side of the road to take in two swales that are part of the headwater seeps of Otterdam Creek, and that support slightly larger numbers of the sun-facing coneflower

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the primary ecological

boundary and some additional lands to allow for ecological buffers and managerial access. The secondary ecological boundary follows the primary ecological boundary around the northern and southern ends of the site. The secondary boundary expands somewhat on the northwest side of the site to encompass the headwaters swale/seep feeding into Otterdam Creek. Both ecological boundaries coincide briefly at a private road. This is a well maintained, gated logging road. The secondary ecological boundary also widens slightly to include an intermittent stream bed on the southeastern side of the road. The stream bed is adjacent to the population of the sun-facing coneflower which is frequently found in moist, seasonally flooded swales (Wright, 1989). The amount of land included in the secondary ecological boundary should adequately provide for expansion into potential habitat, with active management, for the sun-facing coneflower. Buffer land included within the secondary ecological boundary should also provide sufficient managerial access.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 57 acres.

Secondary acreage (acreage within secondary ecological boundary)- 83 acres.

Total acreage recommended for protection- 140 acres.

TRACTS:

Number of ownership tracts within site: three.

Number of ownership tracts within the primary ecological boundary: one. The land which encompasses both the primary and secondary ecological boundaries for this site is owned by one landowner, although the roadsides (right-of-way, 20 feet on each side - from center of hard surface) are owned and managed by Virginia Department of Transportation (VDOT).

ONSITE AND OFFSITE CONSIDERATIONS:

Much of this site is commercial forest land and is managed for pulpwood production. It is planted with loblolly pine. Areas where rare species are concentrated are likely old log staging areas, wetland fringes where tree growth may be inhibited, and roadside maintenance areas. Japanese honeysuckle has invaded some portions of the site and carpets the swale area. There have been some recent wildfires in the area, though prescribed burning is not practiced on the commercial forest acreage. Nearby timberlands are leased to local hunt clubs.

Logging practices on nearby lands should be carefully planned to avoid damage to sensitive plants and their habitat. Access routes for heavy equipment in and around the area should avoid sensitive plant habitat.

The roadside continues to be managed with standard management activities such as mowing, ditching, and spraying. Herbicide spray

plans should consider potential drift into sensitive areas and determine no spray zones and buffer widths. New ditching, digging or logging could occur at any time, and should be considered imminent threats. Controlling natural forest succession is crucial to the preservation of the sun-facing coneflower, however, heavy equipment or physical alteration would be extremely damaging to this population. VDOT road improvement plans for Route 625 should be carefully monitored as roadside alteration and physical destruction pose obvious threats to this rare plant population. A close, accurate and current line of communication should be maintained with VDOT to prevent the unintentional destruction of this population of the sun-facing coneflower.

The Disputanta site is located in a "Critical Conservation" area for Prince George County (Ramming, 1986). The comprehensive plan describes this site as an area where development is restricted. In this area, development is restricted primarily by soil type, which is Muckalee-Levy. The Muckalee-Levy soils are very poorly drained with a loamy or clayey substratum.

MANAGEMENT RECOMMENDATIONS:

The sun-facing coneflower is a poor competitor with woody vegetation. Therefore, natural succession to woodland may threaten the continued viability of this population. Means of preventing succession will be critical to maintaining the population of the coneflower at this site. Photographs and notations by Wright in 1989, indicate that this site was apparently burned seven to ten years ago, although no recent management is evident. The Disputanta site is in desperate need of active fire management. A long-term fire management program (encompassing the seasonality and frequency of burning) needs to be developed based on the results of life history studies and fire effects research. This particular land management technique is compatible with ongoing forest resource management activities. It is recommended that Department of Conservation and Recreation stewardship staff develop prescribed burn research plans and work with the appropriate landowners in implementation.

Besides reduction of woody cover, prescribed burning may increase mineral soil areas where rare plants germinate and release nutrients in the soil for improved growth. Some form of hydrologic research assessments are warranted to better understand the role of water in influencing vegetation structure and composition.

Since this is the only known population of the globally rare sun-facing coneflower in Virginia, a regular annual monitoring program is recommended. A long-term monitoring program of this plant would help ensure the continued vitality and health of the population.

The exotic species encroachment into the sun-facing coneflower habitat needs to be monitored and an appropriate invasive species control program should be designed and implemented.

Because collection could pose a threat to this population of rare plants, the precise location of the sun-facing coneflower occurrence should probably be kept confidential.

PROTECTION RECOMMENDATIONS:

Initial contact has been made with the primary landowner and basic site protection and management options were discussed. At a minimum a long-term management plan following the guidelines mentioned above should be implemented. Strong forms of protection are encouraged because of the great rarity of the sun-facing sunflower in Virginia.

INFORMATION NEEDS:

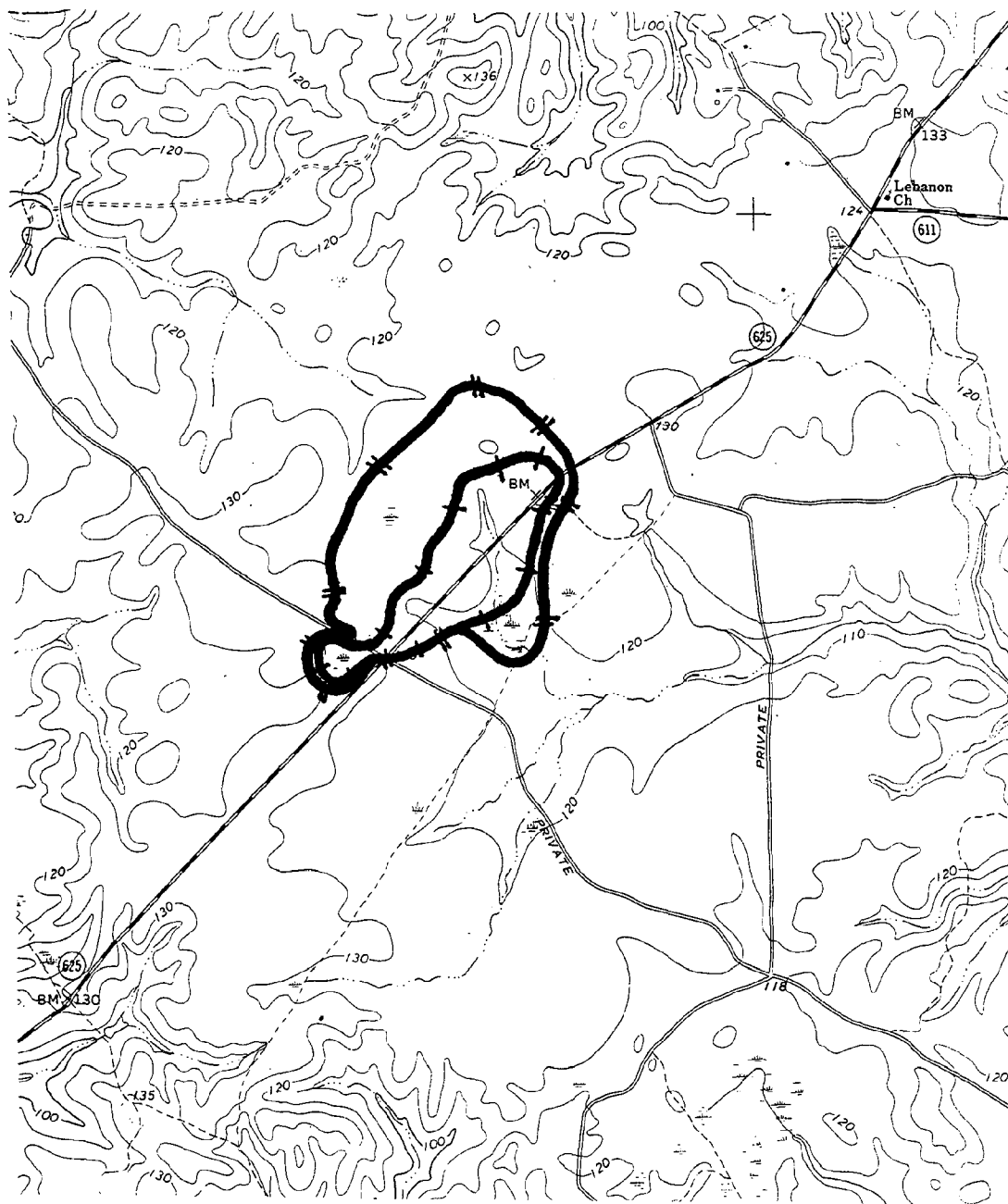
Further research needs to be conducted on the hydrology of the area and how it affects this rare plant. Additional life history information is needed on the sun-facing coneflower, pertaining to roles of sexual and asexual reproduction, seed viability and requirements for seedling establishment (Ware, 1991).

Research into the fire history of the area is needed, as well as more information about the effects of fire on these plants and their habitat.

Further invertebrate inventories are needed in this area. Specifically, more information about the dragonfly is needed to determine some population demographics such as size, reproductive activity and health.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that Prince George County provide an educational program which focuses on natural resources within the area, and on local natural resource and environmental issues. This program could be administered through the Parks and Recreation Department, the Planning Department or through the local schools.



SITE NAME: DISPUTANTA
USGS 7.5' QUADRANGLE: DISPUTANTA NORTH
SCALE: 1:24,000

NORTHWEST RIVER MACROSITE

Size: Approximately 16 miles
(river channel and adjacent forests and marshes)

Location: Virginia, City of Chesapeake
Quad: Moyock, Lake Drummond SE
Quad Codes: 3607652, 3607653

Overview:

The headwaters of the Northwest River are in the City of Chesapeake, just east of Route 17, the intracoastal waterway (which is the Dismal Swamp Canal) and the eastern edge of the Great Dismal Swamp National Wildlife Refuge. The river originates from groundwater, ditches and drainage from the southern half of the historic Dismal Swamp, and possibly from part of the existing Swamp as well. The Northwest River runs a short distance (16 to 18 miles) from east of the Great Dismal Swamp to just below the Virginia/North Carolina line. Shortly after entering North Carolina, the Northwest River empties into Tull Bay which then flows into the southern reach of the North Landing River, and ultimately, into Currituck Sound.

As the Northwest River follows a course through southeast Virginia, it is generally slow moving and fairly shallow with extensive swamp forests and marshes. The watershed of the Northwest River, the associated forests, marshes, and river channel, support a diverse and rich assemblage of natural resources. In addition to harboring many rare species of plants, animals and vegetative communities, the river supports many recreational activities.

Description of Macrosite:

The Northwest River Macrosite includes the entire reach of the river (from just east of the Great Dismal Swamp National Wildlife Refuge to the Virginia/North Carolina state line) and some critical adjacent lands. Within the Macrosite, which includes a city park, three conservation sites and numerous natural heritage resources have been identified (see Table 1). All three conservation sites are located near the Battlefield Boulevard bridge across the Northwest River, and all sites include the river channel and portions of the nearby forests and marshes.

The Great Dismal Swamp, believed to have been formed approximately 10,000 years ago is located at the northwestern edge of the Northwest River Macrosite. The boundary drawn here is obviously an arbitrary separation (made for political and logistical reasons). The Northwest River, obviously, is inseparably interconnected with the Great Dismal Swamp, and the riverine system still retains much of the wild, ecologically rich character of the swamp. Because the

area floods seasonally, and because it can occasionally be rather inhospitable, there are areas within the watershed that remain quite similar to the original swamp. These areas often support many species of plants and animals which are now rare in Virginia.

Along this stretch of the Northwest River, three unusual vegetative communities and many rare plant and animal species have been identified. Extensive marshes, forested swamps, small raised islands and open river and creek channels support many rare species and are integral parts of one of the most biologically significant areas in Virginia.

The marshes in this area represent two broad community types; low herbaceous palustrine wetland and mid-height herbaceous palustrine wetland. These rare wetland communities are rich in diversity and support many rare plant and animal species. Areas of low marsh vegetation occur away from the primary creek channels. In these low marshes are found such plant rarities as the ten-angle pipewort (Eriocaulon decangulare), elongated lobelia (Lobelia elongata), winged seedbox (Ludwigia alata), beaked spikerush (Eleocharis rostellata), and slender-leaved dragon head (Physostegia leptophylla).

Tall robust emergents such as big cordgrass (Spartina cynosuroides), common reed (Phragmites australis), broad-leaf cattail (Typha latifolia), narrow-leaf cattail (Typha angustifolia), and black needlerush (Juncus roemerianus) dominate many of the remaining marshes along the Northwest River. These diverse marshes also support rare animals such as the little grass frog (Limnaeodactylus ocularis), carpenter frog (Rana virgatipes) and the scarce swamp skipper (Euphyes dukesi).

The small, raised islands here, characterized by submesotrophic forests of loblolly pine, red oak, American beech and sourwood, are unusually rich in woody species. Over 24 woody plants have been documented here, including the rare shrub, silky camellia (Stewartia malachodendron). Silky camellia is rare throughout its range, and is known from fewer than 20 locations in Virginia. Although some of the larger islands along the Northwest River may have been selectively logged in the past, vegetation recovery appears to be complete for some of the islands located within primary ecological boundaries of some of the conservation sites. Department of Conservation and Recreation ecologists have suggested that some of these areas may actually represent pre-settlement conditions.

The extensive forested swamps along the river support such species as bald cypress (Taxodium distichum), water tupelo (Nyssa aquatica), loblolly pine (Pinus taeda), sweet gum (Liquidambar styraciflua) and red maple (Acer rubrum). These forested wetlands also support the rare epiphytic sedge (Carex decomposita), known from only one other watershed in Virginia.

Epiphytic sedge and winged seedbox are very rare plants, and the populations along the Northwest River are considered to be some of the finest anywhere for these species. Epiphytic sedge, often called cypress-knee sedge is found in disjunct locations throughout it's historic range (Ostlie, 1990). At one time, the range of this sedge included the east coast and midwestern United States, but in recent years the range has shrunk considerably. Epiphytic sedge is found usually in undisturbed, organic-rich backwaters; it occurs on floating or partially submerged rotting logs, stumps and most often, on cypress knees along the edge of the swamp forest. It is a perennial species that bears its perigynia in mid-summer. Dispersal of seeds is believed to be facilitated by waterbirds, carried inadvertently on the feet and deposited onto the log or stump when the birds come to rest (Ostlie, 1990). Epiphytic sedge is threatened by negative changes in water quality, direct habitat destruction, and disruptions in normal hydrology which may significantly raise or lower water levels.

The canebrake rattlesnake (Crotalus horridus atricaudatus) is one of the rare vertebrates found within the Northwest River watershed, and is state listed as endangered. This animal is a subspecies of the timber rattlesnake yet it inhabits only a small portion of the southeast corner of the state. It's numbers here are decreasing rapidly due to habitat loss and deliberate molestation and destruction by people. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits (Savitsky, pers. comm.) but spends large amounts of time resting in cypress swamps in or near the water. These snakes are good swimmers and readily enter the water. The canebrake rattlesnakes spend approximately four to five months in underground hibernacula during the winter. Canebrake rattlesnakes are reclusive and non-aggressive (Savitsky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The Dismal Swamp southeastern shrew (Sorex longirostris fisheri) is another rare animal found within the Northwest River Macrosite. This shrew is listed as threatened on both the Federal and State level. These tiny mouse-like mammals spend much of their time under leaf litter and under and around decaying logs and stumps. In spite of a physical similarity to mice and other small rodents, this mammal is actually an insectivore (Order Insectivora) and its diet consists primarily of spiders, grubs, earthworms and insect larvae. It is believed that these small mammals bear one to two litters of young per year, but because shrews are small and secretive, much of the biology and natural history of these animals remains unknown. Principle threats to these animals are habitat destruction and loss; and habitat alteration which promotes interbreeding with the more common upland shrew, the southeastern shrew (Sorex longirostris longirostris).

Many of the marshes associated with the Northwest River are used by hunt clubs and individuals for hunting throughout the various

seasons. Fishing is a very popular activity in most of these areas including the river, it's marshes and tributaries. Additionally, the river supports a number of other recreational activities from water skiing and boating to canoeing, nature tourism, photography and wildlife watching. The Northwest River is under consideration by the Department of Conservation and Recreation for inclusion into the State Scenic Rivers System; it has also been recommended for inclusion in the Virginia Natural Area Preserve System.

Locality description:

This corridor, which supports many natural resources is located within the City of Chesapeake, hydrologic unit HUC 03010205 and watershed K04. The city is located within Planning District Number 23, the Hampton Roads Planning District. It is recommended that city planners, officials and citizens of the City of Chesapeake be informed of the State and National significance of the Northwest River. The Northwest River's importance as a resource, and the necessity of preserving the integrity of the entire riverine ecosystem should be stressed.

Threats:

Residents of the City of Chesapeake obtain their water primarily from the Northwest River. The principle withdrawal station is just below (downstream from) the Battlefield Boulevard bridge, which is within the proposed macrosite. Increased withdrawals from the Northwest River could adversely affect the hydrology of the river, and could ultimately degrade and jeopardize the many resources and activities that it supports.

Agricultural and urban non-point source pollution pose another serious threat to this special ecosystem. Department of Conservation and Recreation's Division of Soil and Water Conservation has rated this particular watershed as a high priority in the state for agricultural non-point source concerns. Increased land conversion for alternate uses may lead to increased urban runoff and pollution, further endangering the Northwest River and its associated flora and fauna. Carefully planned, responsible development should be strongly encouraged in these critical areas.

A landfill proposed for the area east of the Great Dismal Swamp National Wildlife Refuge represents both immediate and long-term threats to this ecosystem. Immediate threats would obviously be habitat destruction, clearing of old, swamp forests for alternative purposes, and the many impacts that this type of development can impose. Further fragmentation of one of the few remaining large, forested tracts which connects the Great Dismal Swamp and the Northwest River watershed can pose grave long-term threats. The forested swamps and marshes of the Northwest River act as a vital corridor for countless species of plants and animals (both common and rare). Plants and animals use this corridor not only for physical movement from one place to another, but as a means for healthy genetic flow as well. This corridor connects the Great

Dismal Swamp with the Northwest River, Tull Bay, the Albemarle Sound and ultimately, the North Landing River. Fragmentation and disruption of this corridor could have serious long-term impacts on this riverine ecosystem.

Another threat to the rare plants and animals within the Northwest River ecosystem is the conversion of bordering forests to alternate land uses. These natural lands serve as buffers which maintain the integrity of the river and its associated marshes. Conversion of land for alternative uses could threaten the hydrologic integrity of the river.

Protection recommendations:

Acquisition and landowner/management agreements are recommended for the lands associated with the conservation sites. Protection of the lands within the Northwest River Macrosite would preserve a large, contiguous area which supports a tremendous array of rare natural resources.

Within the Northwest River Macrosite, and ideally located among the conservation sites, is the Northwest River Park. This city park supports several rare natural heritage resources and contributes substantially to the long-term viability and protection importance of the macrosite as a whole.

The Northwest River is currently under consideration for inclusion in the Virginia Scenic Rivers System. The river has received several 'recommendations' as such, and is scheduled to be evaluated in the future.

Cooperative conservation planning is imperative for preserving the Northwest River and the resources and activities that it supports. It is recommended that joint efforts be undertaken between localities, conservation organizations, state agencies, federal agencies, Great Dismal Swamp National Wildlife Refuge, local citizens groups and private citizens. An example of joint community, state and private group action to protect a river corridor is the Saco River Corridor Commission in Maine. This commission has been in effect for approx. 20 years, and has been extremely successful; it incorporate 20 Maine municipalities and was approved by the state legislature in 1973.

Table 1. List of Natural Heritage Resources: Northwest River
Macrosite

Common Name	Scientific Name	State Rank	State Status	Global Rank
communities:				
Low Herbaceous Palustrine Wetland		S2	-	*G2G3
Mid-Height Herbaceous Palustrine Wetland		S2	-	*G3G4
Submesotrophic Forest		S2	-	* -
plants:				
Ephiphytic sedge	<u>Carex decomposita</u>	S1	-	G3G4
Sawgrass	<u>Cladium jamaciensis</u>	S1	-	G5
Beaked spikerush	<u>Eleocharis rostellata</u>	S1	-	G5
Ten-angle pipewort	<u>Eriocaulon decangulare</u>	S1	-	G5
Elongated lobelia	<u>Lobelia elongata</u>	S1	-	G3G5
Winged seedbox	<u>Ludwigia alata</u>	S1	-	G3G4
Aster-like boltonia	<u>Boltonia asteroides</u>	S2	-	G5
Slender-leaved dragonhead	<u>Physostegia leptophylla</u>	S2	-	G4G5
Silky camelia	<u>Stewartia malachodendron</u>	S2	-	G4
Purple bladderwort	<u>Utricularia purpurea</u>	S2	-	G4
Greater bladderwort	<u>Utricularia vulgaris</u>	S2	-	G5
animals:				
Canebrake rattlesnake	<u>Crotalus horridus</u> <u>atricaudatus</u>	S1	LE	G5TUQ
Scarce swamp skipper	<u>Euphyes dukesi</u>	S2	-	G3G4
Dismal Swamp southeastern shrew	<u>Sorex longirostris</u> <u>fisheri</u>	S2	LT	G5T2
Little grass frog	<u>Limnaeodius ocularis</u>	S3	-	G5
Carpenter frog	<u>Rana virgatipes</u>	S3	-	G5

(*Global ranks for communities are estimates based on incomplete information.)

NORTHWEST RIVER SMITH CREEK

LOCATION: Virginia, City of Chesapeake
 Quadrangle: Moyock Quadrangle code: 3607652

BIODIVERSITY RANK: B3

DIRECTIONS:

This site is approximately 3 miles east of the community of Northwest. It encompasses the marshes on the east side of the Northwest River, south, southeast of the Northwest River Park and just north of the VA/North Carolina line.

GENERAL DESCRIPTION:

The Smith Creek site supports good examples of both low and mid-height herbaceous palustrine wetland communities, as well as forested wetlands. Along this stretch of the Northwest River, wind tides cause irregular water level fluctuations and the water is fresh to very slightly brackish. Plant species richness is high, and a mosaic of different vegetation types exists. The wetland communities here support a rich diversity of rare plant (6) and animal (5) species, in addition to the two unusual marsh communities.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
communities:						
Low Herbaceous Palustrine Wetland		G2G3	S2	C	-	-
Mid-Height Herbaceous Palustrine Wetland		G3G4	S2	C	-	-
plants:						
<u>Carex decomposita</u>	epiphytic sedge	G3G4	S1	BC	3C	C
<u>Cladium jamaciensis</u>	sawgrass	G5	S1	BC	-	-
<u>Eriocaulon decangulare</u>	ten-angle pipewort	G5	S1	BC	-	-
<u>Lobelia elongata</u>	elongated lobelia	G4G5	S1	A	-	-
<u>Physostegia leptophylla</u>	slender-leaved dragonhead	G5	S2	A	C2	-
<u>Utricularia vulgaris</u>	greater bladderwort	G5	S2	B	-	-
animals:						
<u>Limnaeodius ocularis</u>	little grass frog	G5	S3	B	-	-
<u>Rana virgatipes</u>	carpenter frog	G5	S3	AB	-	-
<u>Crotalus horridus atricaudatus</u>	canebrake rattlesnake	G5T5Q	S1	-	-	LE
<u>Euphyes dukesi</u>	scarce swamp skipper	G3G4	S2	-	-	-
<u>Sorex longirostris fisheri</u>	Dismal Swamp southeastern shrew	G5T2	S2	-	LT	LT

This area of extensive marsh vegetation and forested wetlands is part of the Northwest River watershed. The Northwest River originates in the southern half of the historic swamp, and in the existing Great Dismal Swamp, which is thought to have been formed

approximately 10,000 years ago. The Great Dismal Swamp National Wildlife Refuge, which is now the existing swamp, is just eight to nine miles upstream of this natural area, and much of the riverine ecosystem retains the wild, ecologically rich character of this swamp. Because the area is seasonally flooded, and because it has a reputation for being somewhat inhospitable, there are pockets of habitat that remain quite similar to the historic Great Dismal Swamp. These pockets, like the large, natural area where the Smith Creek site is located, often support many species of plants and animals which are now rare in Virginia.

The marshes at Smith Creek represent two broad community types; low herbaceous palustrine wetland and mid-height herbaceous palustrine wetland. These rare wetland communities are rich in diversity and support several rare plant and animal species. Areas of "low marsh" vegetation occur away from the primary creek channels. In these low marshes are found the rare ten-angle pipewort (Eriocaulon decangulare) elongated lobelia (Lobelia elongata), little grass frog (Limnaeodius ocularis), carpenter frog (Rana virgatipes) and the scarce swamp skipper (Euphyes dukesii).

Tall robust emergents such as big cordgrass (Spartina cynosuroides), common reed, a potentially aggressive grass, (Phragmites australis), broad-leaf cattail (Typha latifolia), narrow-leaf cattail (Typha angustifolia), and black needlerush (Juncus roemerianus) dominate most of the remaining marshes at Smith Creek.

Many of the marshes at Smith Creek are being invaded by woody species such as red maple (Acer rubrum), swamp rose (Rosa palustris) and waxmyrtle (Myrica cerifera). Lack of regular burning allows woody species succession to proceed. Active monitoring and appropriate fire management will enhance the marshes and the rare plant species found there.

The forested wetlands at the Smith Creek site support bald cypress (Taxodium distichum), water tupelo (Nyssa aquatica), black gum (Nyssa biflora), loblolly pine (Pinus taeda), sweet gum (Liquidambar styraciflua) and red maple. Canebrake rattlesnakes (Crotalus horridus atricaudatus) and the Dismal Swamp southeastern shrew (Sorex longirostris fisheri) are also found in these forested wetlands.

Epiphytic sedge, often called cypress-knee sedge (Carex decomposita) is one of the rare plants known from this site. At one time, the range of this sedge included the east coast and midwestern United States, but in recent years the range has shrunk considerably. It is now found in somewhat disjunct locations throughout parts of it's historic range (Ostlie, 1990). The epiphytic sedge is found usually in undisturbed, organic-rich backwaters; it occurs on floating or partially-submerged rotting logs, stumps and most often, on cypress knees along the edge of the

swamp forest. It is a perennial species that bears its perigynia in mid-summer. Dispersal of seeds is believed to be facilitated by waterbirds, carried inadvertently on the feet and deposited onto the log or stump when the birds come to rest (Ostlie, 1990). Epiphytic sedge is threatened by negative changes in water quality, direct habitat destruction and disruptions in normal hydrology which may either raise or lower water levels.

The two rare amphibians at Smith Creek, little grass frog and carpenter frog occur throughout the marshes as do the scarce swamp skipper, the canebrake rattlesnake, and the Dismal Swamp southeastern shrew. Although the rattlesnake and the shrew can probably be found within the marshes, they are most often associated with the marsh/upland forest interface or edge.

The canebrake rattlesnake (Crotalus horridus atricaudatus) is state listed as endangered. This animal is a subspecies of the timber rattlesnake, found throughout the eastern portion of the country, but in Virginia, the canebrake rattlesnake inhabits only a small portion of the southeast part of the state. Its numbers here are decreasing rapidly due to habitat loss and deliberate molestation and destruction by people. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits (Savitsky, pers. comm.) but spends large amounts of time resting in cypress swamps in or near the water. These snakes are good swimmers and readily enter the water. The canebrake rattlesnakes spend approximately four to five months in underground hibernacula during the winter. These animals are reclusive and non-aggressive (Savitsky, pers. comm., Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

Another somewhat 'invisible' animal is the Dismal Swamp southeastern shrew (Sorex longirostris fisheri). This animal is found only in southeastern Virginia (in the Dismal Swamp and some remnant locations) and in northern/north eastern North Carolina, and is listed as threatened on both the Federal and State level. These tiny mouse-like mammals spend much of their time under leaf litter, and under and around decaying logs and stumps. The primary food source of this shrew is spiders, earthworms, grubs and other insect larvae. It is believed that they bear one to two litters of young per year, but because shrews are small and secretive, much of the biology and natural history of these animals remains unknown. Principle threats to these animals are habitat destruction and loss; and habitat alteration which allows interbreeding with the more common upland shrew, the southeastern shrew (Sorex longirostris longirostris).

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the two marsh communities (low and mid-height herbaceous palustrine wetlands) and the occurrences of rare plant and animal species and the respective potential habitats. The marsh community types 'intertwine'

somewhat forming a "habitat mosaic" with small upland islands within the marshes. Plant and animal occurrences are scattered and distributed by microhabitat throughout this mosaic, and for this reason, element locations are not specifically identified.

The principle purpose of the primary ecological boundary is to delineate and encompass known occurrences of targeted resources at the site, as well as existing and potential habitats of those resources. Inclusion of some additional marshes provides excellent restoration potential (with active management) for wetland plant species. The upland islands and upland/marsh interface areas are critical habitat for the canebrake rattlesnake and the Dismal Swamp southeastern shrew.

The primary ecological boundary follows the Northwest River channel and the State line to the south. On the east side of the site, the primary boundary skirts agricultural fields in an attempt to allow foraging and cover for the canebrake rattlesnake. The northeast portion of the site encompasses Smith Creek and the associated marshes and swamp forests up to Baum Road at the intersection of Baum and Indian Creek Roads.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the primary ecological boundary, rare plant and animal occurrences and critical ecological and administrative buffers. Some upland is included within the secondary ecological boundary as critical buffer from agricultural land uses. One of the purposes of the secondary ecological boundary is to provide a hydrologic buffer. Good water quality and the persistence of normal hydrology are important factors for maintaining sensitive marsh communities. This protective buffer, located at the interface between marsh and upland forest communities is also crucial habitat for the canebrake rattlesnake and the Dismal Swamp southeastern shrew.

The secondary ecological boundary follows the primary ecological boundary at a distance of 75 - 150 feet. The two boundaries coincide on the southern edge of the site, along the State Line where they are adjacent to the boundary of Northwest River Marsh Game Lands. The primary and secondary ecological boundaries also coincide on the southeastern edge of the site, and along part of the northern edge of the site, where the secondary ecological boundary adjoins the Northwest River Park.

It is important to note that this site and others are only pieces of a much larger natural area. They are of course, integral parts of a large riverine ecosystem, but for the sake of consistency with the APES inventory report, they have been described separately. Some of the boundaries, such as the city park and the state line are obviously political boundaries and it should be noted that the ecosystem, which is of primary importance, is not and can not be partitioned in these ways. It is important to view the Northwest

River and the associated conservation sites as a whole, vital ecosystem. Therefore, comprehensive conservation planning should strongly consider the boundaries described in the Northwest River Macrosite which encompass much of the Northwest River watershed and which extend to connect with the Great Dismal Swamp.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 668 acres

Secondary acreage (acreage within secondary ecological boundary)- 272 acres

Total acreage recommended for protection- 940 acres

TRACTS:

Number of ownership tracts within site: nine.

Number of ownership tracts within the primary ecological boundary: Nine tracts, representing eight private landowners, are within the primary ecological boundary.

ONSITE AND OFFSITE CONSIDERATIONS:

Surrounding land use is primarily agricultural and silvicultural. Past use has predominantly been hunting and fishing. The swamp forest on the east side of the site is an interface between the marshes and forested upland and is rapidly disappearing as current landowners timber and then convert the natural lands for alternative uses. The Northwest River was identified in the Nonpoint Source Pollution Watershed Assessment Report as having a high potential (H1) for pollution impact from nutrient loadings from agricultural land (Wilson, 1993). Residential or agricultural development and large tract, clear-cut timbering in the area are serious offsite considerations which may influence the integrity of the marshes as well as future management activities. Best management practices designed to avoid soil compaction and excessive sedimentation should be adhered to for all activities within this area.

This area lies entirely within the City of Chesapeake. It is within hydrologic unit HUC 03010205, watershed K04 (Wilson, 1993). The City Comprehensive Plan (Curtis, 1990) has designated the Northwest River a 'conservation area' primarily because the Northwest River is a main source of the city's surface water. Although the city has several wells, all surface water is drawn off of the Northwest River at an out-take location just east of the Battlefield Boulevard Bridge. The Comprehensive Plan defines the City's plans to monitor and control the quality of the water in the Northwest River by the following four principles:

1. Promotion of the Northwest River's special characteristics and the need for water quality management.
2. Exclusion of activities which threaten the water supply from the basin, or at least the portion of the basin near

the intake.

3. Constant monitoring of the river to ascertain water quality conditions.

4. Control and monitoring of land use activities; the institution of good land management practices.

In 1987 the City of Chesapeake entered into a contractual agreement with the City of Virginia Beach whereby Chesapeake would share in the development, cost and ownership of the Lake Gaston water resource project. This project and all ensuing agreements are proceeding slowly due to a great deal of citizen and political opposition to the project.

Smith Creek is contiguous with, and located south, southeast of the Northwest River Park. Northwest River Park is a city park within Chesapeake which supports several rare plant and animal species. On the west side of the Northwest River, and also contiguous with Smith Creek and Northwest River Park is another proposed natural area, the Southwestern Marshes Site. The Southwestern Marshes site supports nine rare plants and five rare animals. On the Virginia/North Carolina state line, the Smith Creek site is adjacent to the Northwest River Marsh Game Land. The Smith Creek and Southwestern Marshes sites are similar exemplary occurrences of this wetland community type but support a different mix of rare species. Protection of Smith Creek would result in a large, contiguous, diverse natural area which supports many rare species of plants and animals.

MANAGEMENT RECOMMENDATIONS:

Woody species such as red maple, swamp rose and wax myrtle seem to be increasing in some of the marshes and less frequent fire in the marshes is probably contributing to this woody plant invasion. These marshes are in tremendous need of active fire management, which would enhance and preserve the marshes and the rare plant species found there. Fire history studies will help determine appropriate fire regimes for these wetlands. It is recommended that Department of Conservation and Recreation stewardship personnel develop and implement a fire management plan for this area.

Common reed (Phragmites australis), a potentially aggressive marsh grass, occurs in many of the marshes. In some parts of the Northwest River, this grass does not appear to be increasing, while in other sections it is forming large dense clones.

An interagency reed-grass control project is currently underway which evaluates stands of common reed along the Northwest River. Some limited control work with an herbicide and prescribed fire management is being conducted this year, and monitoring of these and additional stands will continue. This species should be monitored, and disturbances to the wetland vegetation (which favor common reed) should be avoided.

Much information about the biology and natural history of some of these natural heritage resources is lacking. Continued research on and monitoring of many of these species will enhance knowledge of these resources, and allow for more refined and effective conservation planning.

Where public access is planned, it is recommended that experts on the rattlesnake and on the shrew be consulted to minimize impacts to these especially sensitive species.

Water quality and quantity are crucial to many rare species, but particularly to the rare Carex decomposita. A significant change in the water level, resulting in an extended elevated or lowered level could be extremely detrimental to existing epiphytic sedge populations. The status and health of the sedge population should be closely monitored, as well as water levels and the withdrawal/use situation in the City of Chesapeake.

PROTECTION RECOMMENDATIONS:

These wetlands have been recommended for inclusion within the Virginia Natural Area Preserve System. Acquisition is recommended for land within the primary ecological boundaries, and negotiations with several landowners are underway. The land included within the secondary ecological boundary need not be acquired, however, the maintenance of this land as a buffer for marshes, water quality and natural heritage resources is critical. For this reason, management agreements and landowner agreements are recommended for the land encompassed by the secondary boundary.

Access to this site could be achieved either through an agreement with the Northwest River Park, or by a public boat landing on Smith Creek, located at the corner of Baum Road and Indian Creek Road. Currently this dirt ramp is used only occasionally by fishermen, but Smith Creek runs directly to the Northwest River, and this should afford good access to the marshes and river channel.

This is an ideal site for protection efforts because it is uniquely located between two large, partially protected areas. To the north, with adjacent boundaries, lies the Northwest River Park, managed by the City of Chesapeake Department of Recreation, and to the south, also adjacent to Smith Creek, is the Northwest River Marsh Game Land, managed by the North Carolina Game Commission. Although the City park is managed primarily for outdoor recreation, park personnel are aware of rare natural heritage resources located within the park, and attempt to afford these species some protection. The Game Land is not actively managed, although it is used seasonally by hunters. This area has no public access roads and is protected from residential and agricultural development. Protection specifically of the Smith Creek site is extremely important. This site and the Northwest River Park support many rare species. In addition to providing protected, contiguous habitat, it is highly probable that the N.C. Game Land supports

rare species as well. Active management of the marshes at Smith Creek will enhance existing populations and allow additional colonization by rarities.

INFORMATION NEEDS:

Additional vertebrate and invertebrate inventories are needed in this area. Further inventories will likely reveal more rarities supported by this site. Additional research is needed into the status and health of the existing populations of the Dismal Swamp black bear (Ursus americanus) and the eastern big-eared bat (Plecotus rafinesquii).

Future water procurement and use plans for the City of Chesapeake should be closely monitored to avoid negative impacts on the Northwest River and associated habitats.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

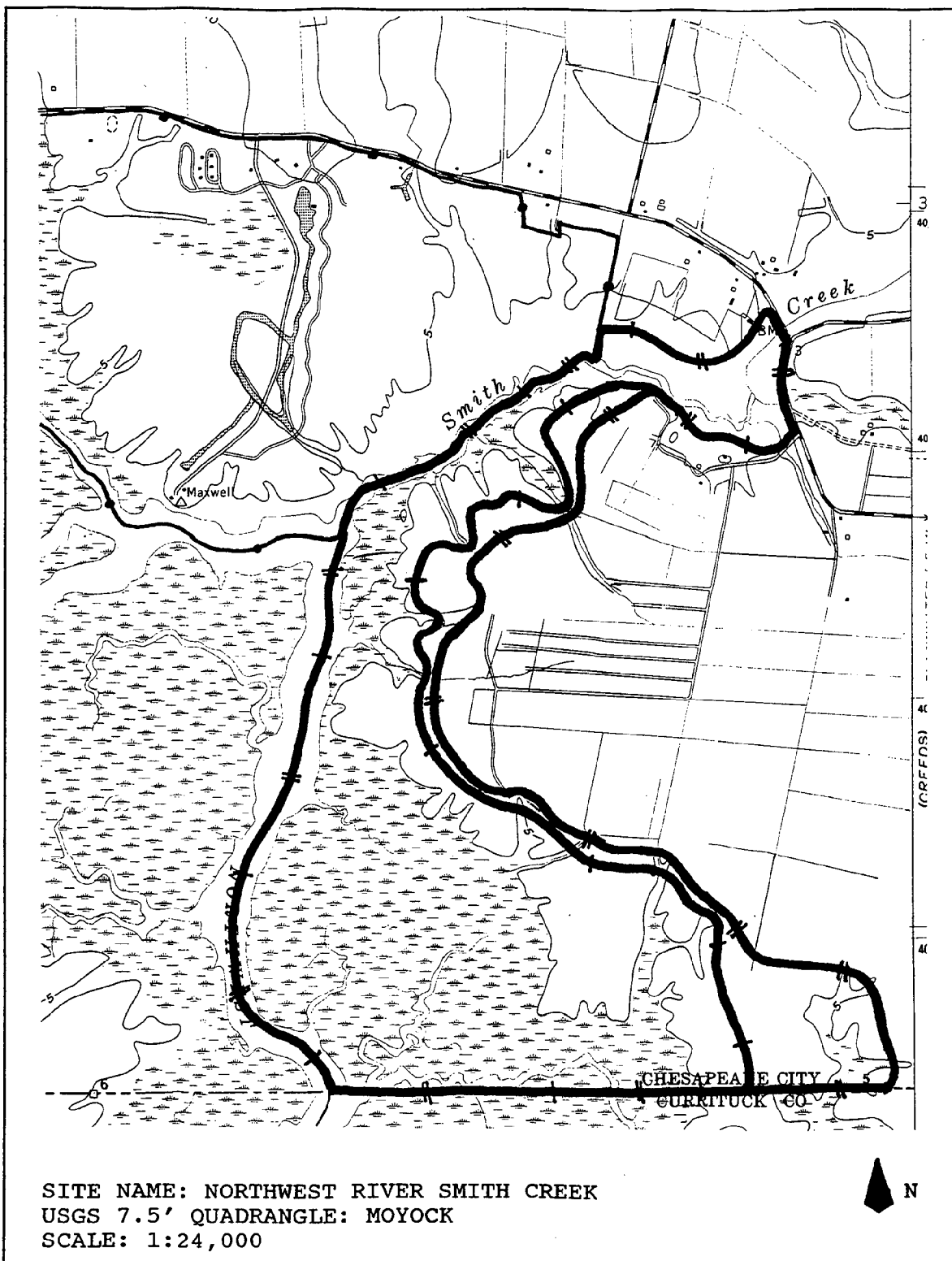
It is recommended that the City of Chesapeake:

- Provide an educational program which focuses on natural resources within the area.

- Make local developers aware of the natural resource issues which are relevant to the area and encourage them to include public interpretive opportunities and conservation mechanisms in design plans for the area.

The Northwest River is currently under consideration for inclusion in the Virginia Scenic Rivers System. The river has received several 'recommendations' as such, and is scheduled to be evaluated in the future.

The Northwest River is included in the "Public Access and Visual Assessment for the North Landing River Watershed" planning study. This study is a planning study funded in part by the Coastal Zone Management Program, which is administered by the Department of Environmental Quality (DEQ), through a grant of the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management. The purpose of this study is to evaluate the North Landing and Northwest Rivers for potential public access opportunities and to study the visual components contributing to these scenic waterways.



NORTHWEST RIVER SOUTHWESTERN MARSHES

LOCATION: Virginia, City of Chesapeake
 Quadrangle: Moyock Quadrangle code: 3607652

BIODIVERSITY RANK: B3

DIRECTIONS: This site is located south of the Northwest River Park (just across the river channel) in the City of Chesapeake, on Route 610. It encompasses the marshes on the southern and western sides of the river bend.

GENERAL DESCRIPTION:

Southwestern Marshes supports nine species of rare plants, five rare animal species and two rare marsh communities. Wind tides here cause irregular water level fluctuations and the water is fresh to very-slightly brackish. Plant species richness is high, and a mosaic of different vegetation types exists. This site is quite similar to the Smith Creek site, although the two sites support different mixes of rare plants. Southwestern Marshes is adjacent to the Smith Creek site on the east, the Upper Section site on the west, the Northwest River Park to the north, and barely adjoins the Northwest River Marsh Game Land in North Carolina to the southeast. Protection of this unique area would result in a large, contiguous, extremely diverse natural area which supports many rare species of plants and animals.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
communities:						
Low Herbaceous Palustrine Wetland		G2G3	S2	C	-	-
Mid-Height Herbaceous Palustrine Wetland		G3G4	S2	C	-	-
plants:						
<u>Carex decomposita</u>	epiphytic sedge	G3G4	S1	BC	3C	C
<u>Cladium jamaciensis</u>	sawgrass	G5	S1	BC	-	-
<u>Eleocharis rostellata</u>	beaked spikerush	G5	S1	B	-	-
<u>Eriocaulon decangulare</u>	ten-angle pipewort	G5	S1	BC	-	-
<u>Ludwigia alata</u>	winged seedbox	G3G4	S1	B	-	-
<u>Lobelia elongata</u>	elongated lobelia	G4G5	S1	A	-	-
<u>Physostegia leptophylla</u>	slender-leaved dragonhead	G5	S2	A	C2	-
<u>Utricularia purpurea</u>	purple bladderwort	G4	S2	A	-	-
<u>Utricularia vulgaris</u>	greater bladderwort	G5	S2	B	-	-
animals:						
<u>Crotalus horridus</u>						
<u>atricaudatus</u>	canebrake rattlesnake	G5T5Q	S1	-	-	LE
<u>Euphyes dukesi</u>	scarce swamp skipper	G3G4	S2	-	-	-
<u>Sorex longirostris</u>	Dismal Swamp					
<u>fisheri</u>	southeastern shrew	G5T2	S2	-	LT	LT
<u>Limnaeodius ocularis</u>	little grass frog	G5	S3	U	-	-
<u>Rana virgatipes</u>	carpenter frog	G5	S3	U	-	-

The Southwestern Marshes site and associated marshes and forested wetlands are part of the Northwest River watershed. The Northwest River originates in the southern half of the historic swamp, and in the existing Great Dismal Swamp, which is estimated to have been formed approximately 10,000 years ago. The Great Dismal Swamp National Wildlife Refuge, which is now the existing swamp, is just eight to nine miles upstream of this natural area, and much of the Northwest River ecosystem retains the wild, ecologically rich character of this swamp. Because the area is seasonally flooded, and because it has a reputation for being somewhat inhospitable, there are pockets of habitat which remain quite similar to the original Great Dismal Swamp. These pockets, like the large natural area where Southwestern Marshes is located, often support many species of plants and animals which are now rare in Virginia.

The extensive marshes here represent two broad community types; low herbaceous palustrine wetland and mid-height herbaceous palustrine wetland. These rare wetland communities are rich in diversity, and support many species of plants and animals. A large number of rare plant species are found in these communities including elongated lobelia (Lobelia elongata), beaked spikerush (Eleocharis rostellata), ten-angle pipewort (Eriocaulon decangulare), winged seedbox (Ludwigia alata), twigrush (Cladium mariscoides), and slender-leaved dragonhead (Physostegia leptophylla). The little grass frog (Limnaeodius ocularis), carpenter frog (Rana virgatipes), and the scarce swamp skipper (Euphyes dukesi) can also be found throughout these marshes.

Many of the marshes at this site are being invaded by woody species such as red maple (Acer rubrum), swamp rose (Rosa palustris), and waxmyrtle (Myrica cerifera). Less frequent fire in the marshes is probably contributing to the woody plant invasion problem. Active fire management will enhance the marshes and the rare plant species found there.

Forested wetlands at this site support bald cypress (Taxodium distichum), water tupelo (Nyssa aquatica), black gum (Nyssa biflora), loblolly pine (Pinus taeda), sweet gum (Liquidambar styraciflua) and red maple. These forested wetlands also support the very rare epiphytic sedge (Carex decomposita), known from only one other Virginia watershed.

The winged seedbox, which is found in the low marshes here, is rare throughout its range (Godfrey, 1981). The population found in the Southwestern Marshes site is exemplary, and is considered to be one of the finest populations anywhere (Ludwig, pers. comm.).

Interestingly, this site supports two species of insectivorous plants, and one insectivorous animal. Both the purple bladderwort (Utricularia purpurea) and the greater bladderwort (Utricularia vulgaris), are plants that derive much of their nourishment from

small crustaceans and invertebrates that are trapped, then digested in the plant 'bladders'. They are both state ranked as rare and imperiled. The Dismal Swamp southeastern shrew (Sorex longirostris fisheri), listed as threatened on both the state and federal level is an insectivorous mammal. This tiny animal routinely preys upon meal worms, grubs, spiders and earth worms.

The Southwestern Marshes site supports five rare species of animals. Two of these are rare amphibians, little grass frog, and the carpenter frog. The remaining three animals are the scarce swamp skipper, the canebrake rattlesnake (Crotalus horridus atricaudatus) which is state listed as endangered, and the Dismal Swamp southeastern shrew (mentioned above), all of which occur throughout the marshes and onto the upland interface.

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the known element occurrences and their existing and potential habitats. The extensive marshes, both low and mid-height herbaceous palustrine wetlands are included within the primary ecological boundary, along with some upland interfaces on the southern and southwestern edges of the site. These communities support 13 of the 14 natural heritage resources described for this site. The marsh community types 'intertwine' here, forming a "habitat mosaic" with the uplands. Rare plant and animal occurrences are scattered, and distribution is primarily based upon microhabitat throughout this mosaic. Because of the scattered nature of these occurrences, element locations are not specifically identified on the preserve design map.

The principle purpose of the primary ecological boundary is to delineate and encompass known occurrences of natural heritage resources and existing and potential habitat for those resources. Inclusion of some additional marshes north of the Northwest River channel provides excellent restoration potential for wetland plant species, with active management. The upland islands and interface areas are also critical habitat for the rare vertebrate species supported here.

The primary ecological boundary is contiguous with the Northwest River Park to the north, and with Smith Creek Site (a potential natural area) to the east. On the south and southwest sides of the site, the primary ecological boundary runs long the upland interface with the marshes and skirts existing agricultural fields. The primary ecological boundary then follows the river channel and associated marshes and extends past the train trestle bridge, to the bridge for Route 168, Battlefield Boulevard. At this edge the Southwestern Marshes site is adjacent to the Northwest River Upper Section site. Primary boundaries on the northern edge of the site run just outside of the marshes, taking in several small upland islands, and running north along Indian Creek to Indian Creek Road to include the buffering wetlands on the west side of the creek.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the primary ecological boundary and some additional upland buffer. This buffer zone, provided by the secondary ecological boundary includes lands and water intended to mitigate natural and human threats to the natural heritage resources and associated habitats. Marshes and drainages located north of the Northwest River channel, and included within the secondary boundary provide a vegetated buffer for maintenance of water quality in the marshes, as well as critical habitat for several of the rare vertebrate species supported by this site. Additionally, the buffer should provide for future administrative and managerial access.

The secondary ecological boundary follows the primary ecological at a distance of 75 to 100 feet. The two boundaries coincide at the southern edge of the site, along the state line, and at the northern and western edges of the site. The two boundaries are contiguous with the Northwest River Park on the northern/northwestern side of the site.

It is important to note that this site, and others are only pieces of a much larger natural area. They are of course, integral parts of a riverine ecosystem, but for the sake of consistency with the APES inventory report, they have been described separately. Some of the boundaries, such as the city park and the state line are obviously political boundaries and it should be noted that the ecosystem, which is of primary importance, is not and can not be partitioned in these ways. It is important to view the Great Dismal Swamp, the Northwest River and the associated conservation sites as a whole, vital ecosystem. Therefore, comprehensive conservation planning should strongly consider the boundaries described in the Northwest River Macrosite which encompass much of the Northwest River watershed and which extend to connect with the Great Dismal Swamp.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 1802 acres

Secondary acreage (acreage within secondary ecological boundary)- 258 acres

Total acreage recommended for protection- 2060 acres

TRACTS:

Number of ownership tracts within site: twenty four.

Number of ownership tracts within the primary ecological boundary: Twenty three tracts, representing 21 landowners make up the Southwestern Marshes site.

ONSITE AND OFFSITE CONSIDERATIONS:

Surrounding land use is primarily agriculture and forestry. Much of the land identified within the primary ecological boundary is open marsh with stream channels. Past use has primarily been

hunting and fishing. The swamp forest on the south, southwest side is the interface between the marshes and upland forests. This area has likely been hunted and selectively logged in the past. Residential or agricultural development and large tract, clear-cut timbering in the immediate area could be serious offsite considerations which may influence the integrity of the marshes and future management activities. The Northwest River was identified in the Nonpoint Source Pollution Watershed Assessment Report as having a high probability (H1) for pollution impacts from nutrient loadings from agricultural land. Best management practices designed to avoid soil compaction and excessive sedimentation should be adhered to for all activities within this area.

Water withdrawal and use, from the Northwest River is a primary concern and affects all plants and animals located downstream from the withdrawal station. Ongoing use and withdrawal should be carefully monitored to prevent any changes in the normal hydrology of the river.

This area lies entirely within the City of Chesapeake, hydrologic unit HUC 03010205, watershed K04 (Wilson, 1993). The City Comprehensive Plan (Curtis, 1990) has designated the Northwest River a 'conservation area' primarily because the Northwest River is a main source of the city's surface water. Although the city has several wells, all surface water is drawn off of the Northwest River at an out-take location just east of the Battlefield Boulevard Bridge. The Comprehensive Plan defines the City's plans to monitor and control the quality of the water in the Northwest River by the following four principles:

1. Promotion of the Northwest River's special characteristics and the need for water quality management.
2. Exclusion of activities which threaten the water supply from the basin, or at least the portion of the basin near the intake.
3. Constant monitoring of the river to ascertain water quality conditions.
4. Control and monitoring of land use activities; the institution of good land management practices.

In 1987 the City of Chesapeake entered into a contractual agreement with the City of Virginia Beach whereby Chesapeake would share in the development, cost and ownership of the Lake Gaston water resource project. This project and all ensuing agreements are proceeding slowly due to a great deal of citizen and political opposition to the project.

Southwestern Marshes site is south, southwest of, and adjacent to the Northwest River Park. Another potential natural area

recommended for protection, Smith Creek site, is just east of and adjacent to this one (boundaries abut in the Northwest River channel). The Smith Creek site is also located south of the city park, and has boundaries that coincide with the park's. The southeastern tip of this site adjoins the boundary for the Northwest River Marsh Game Land. The Game Land consists of 1,252 acres which is managed by the North Carolina Wildlife Resources Commission. This area has 'unrestricted hunting and primitive camping' for citizens with hunting and/or fishing licenses. Although it is essentially open to the public, there are no access roads and use is no doubt seasonal. The designation as a Game Land at least affords this area protection against development for alternative uses.

Protection of the Southwestern Marshes site and the Smith Creek site is extremely important. These sites, in addition to the Northwest River Park and the Northwest River Marsh Game Lands support many rare species; active management will enhance existing populations and allow additional colonization by rarities.

MANAGEMENT RECOMMENDATIONS:

The status of woody species in these marshes should be closely monitored, since woody species seem to be increasing in some areas. Less frequent fire is probably contributing to the woody plant invasion in these areas; the open marshes at this site are in desperate need of active fire management. Fire history studies will help determine appropriate fire regimes for this area, and it is recommended that Department of Conservation and Recreation stewardship personnel develop and implement a fire management plan for the wetlands in protective/conservation ownership.

Common reed (Phragmites australis), a potentially aggressive marsh grass, occurs in many of the marshes. In some parts of the Northwest River this grass does not appear to be increasing, while in other sections it is forming large dense clones. This species should be closely monitored, and disturbances to the wetland vegetation (which favor common reed) should be avoided. An interagency reed-grass control project is currently underway which evaluates stands of P. australis along the Northwest River. Some limited control work with an herbicide and prescribed fire management is being conducted this year, and monitoring of these and additional stands will continue. In addition to monitoring, an invasive species control plan needs to be developed for the Northwest River, and specifically for the sites supporting rare and endangered species of plants and animals.

A long-term biological monitoring program needs to be implemented for extremely rare species such as Carex decomposita, which is known from only 1 other watershed in Virginia.

PROTECTION RECOMMENDATIONS:

These wetlands have been recommended for inclusion within the

Virginia Natural Area Preserve System. Acquisition is recommended for some land within the primary ecological boundaries, and negotiations with several landowners are underway. The land included within the secondary ecological boundary need not be acquired, however, the maintenance of this land as a buffer for marshes, water quality and for future active management is critical. Good water quality is imperative for some of the sensitive marsh vegetation, and much of the adjacent land is currently used for alternative purposes.

Access to this site could be achieved by acquisition of, or through landowner agreements concerning, a tract on the south/southwest end of the site. This semi-circle piece of upland has been timbered in the past, but it all fronts along a small secondary road just above the state line. This tract allows access to the marshes, and has sufficient upland for interpretive signs, or visitor information. There are actually numerous tracts along Indian Creek Road with both road and river access that would probably be suitable for the above purposes.

INFORMATION NEEDS:

Additional vertebrate and invertebrate inventories are needed in this area. Further inventories will likely reveal more rarities supported by this site. Additional research is needed into the status and health of the existing populations of the Dismal Swamp black bear (Ursus americanus) and the eastern big-eared bat (Plecotus rafinesquii).

Future water procurement and use plans for the City of Chesapeake should be closely monitored to avoid negative impacts on the Northwest River and associated habitats.

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that the City of Chesapeake:

- Provide an educational program which focuses on natural resources within the area.

- Make local developers aware of the natural resource issues which are relevant to the area and encourage them to include public interpretive opportunities and conservation mechanisms in design plans for the area.

The Northwest River is currently under consideration for inclusion in the Virginia Scenic Rivers System. The river has received several recommendations as such, and is scheduled to be evaluated in the future.

The Northwest River is included in the "Public Access and Visual Assessment for the North Landing River Watershed" planning study. This study is a planning study funded in part by the Coastal Zone Management Program, which is administered by the Department of

Environmental Quality (DEQ), through a grant of the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management. The purpose of this study is to evaluate the North Landing and Northwest Rivers for potential public access opportunities and to study the visual components contributing to these scenic waterways.



SITE NAME: NORTHWEST RIVER SOUTHWESTERN MARSHES
USGS 7.5' QUADRANGLE: MOYOCK
SCALE: 1:24,000



NORTHWEST RIVER UPPER SECTION

LOCATION: Virginia, City of Chesapeake
 Quadrangle: Moyock Quadrangle code: 3607652

BIODIVERSITY RANK: B4

DIRECTIONS:

This site includes the wetland adjacent to the Northwest River, upstream of Route 168 and downstream of Walnut Road. It is directly northwest of the community of Northwest.

GENERAL DESCRIPTION:

This site supports good examples of mid-height herbaceous palustrine wetlands and submesotrophic forests. Many of the significant herbaceous wetlands and marshes occur along the unnamed northern branch of the river. Within the bottomland at this site, forests occur on slightly elevated "islands". One of these islands, approximately 3 acres in size, supports four natural heritage resources. Most of these islands were apparently never cleared for agriculture and are believed to represent, or at least approximate, presettlement conditions. This site supports two rare plant species and two rare animal species in addition to the rare vegetative communities.

NATURAL HERITAGE RESOURCES:

Scientific Name	Common Name	Global Rank	State Rank	EO Rank	Federal Status	State Status
communities:						
Mid-Height Herbaceous Palustrine Wetland		G3G4	S2	C	-	-
Submesotrophic forest		--	S2	U	-	-
plants:						
<u>Boltonia asteroides</u>	aster-like boltonia	G5	S2	D	-	-
<u>Stewartia malachodendron</u>	silky camellia	G4	S2	B	-	-
animals:						
<u>Crotalus horridus</u>						
<u>atridaudatus</u>	canebrake rattlesnake	G5T5Q	S1	-	-	LE
<u>Sorex longirostris</u>	Dismal Swamp					
<u>fisheri</u>	southeastern shrew	G5T2	S2	-	LT	LT

This natural area is part of the Northwest River watershed. The Northwest River originates in the southern half of the historic swamp, and in the existing Great Dismal Swamp, which is estimated to have been formed approximately 10,000 years ago. The Great Dismal Swamp National Wildlife Refuge, which is now the existing swamp, is just eight to nine miles upstream of this site. Much of the Northwest River ecosystem retains the wild, ecologically rich character of this swamp. Because the area floods seasonally, and because it has a reputation for being somewhat inhospitable, there

are pockets of habitat which remain quite similar to the original Great Dismal Swamp. These pockets, like the large natural area where the Upper Section site is located, often support many species of plants and animals which are now rare in Virginia.

This area supports two broad community types, the mid-height herbaceous wetlands, and the submesotrophic forests. Many of these significant wetlands are found along the northern, unnamed branch of the Northwest River. The small herbaceous wetlands found slightly back from the river's edge are significant from a botanical and ecological perspective. These wetlands, sometimes referred to as "fens", occur on quaking mats of organic sediments, and are perennially saturated. Characteristic plants here include twigrush (Cladium mariscoides), beaked-rush (Rhynchospora spp.), water lily (Nymphaea odorata), and the rare species, aster-like boltonia (Boltonia asteroides). Of great scientific interest are the populations of common reed (Phragmites australis), which here show none of the aggressive tendencies evident at many disturbed wetlands in southeastern Virginia.

The islands here, characterized by submesotrophic forests of loblolly pine, red oak, American beech and sourwood, are unusually rich in woody species. Over 24 woody plants have been documented here, including the rare shrub, silky camellia (Stewartia malachodendron). This rare member of the tea family is characteristically found in moist forests, low woods and on creek banks (Radford, 1968). Silky camellia is rare throughout its range, and is known from only 16 locations in Virginia. The silky camellia is a small shrub with lovely, delicate white flowers. Further inventories of this site will likely reveal additional nearby populations of this rare plant.

Although larger islands at this site may have been selectively logged in the past, vegetation recovery appears to be complete. Department of Conservation and Recreation ecologists have suggested that some of these areas may actually represent pre-settlement conditions.

Extensive forested swamps surrounding and within this natural area are dominated by bald cypress (Taxodium distichum), water tupelo (Nyssa aquatica), black gum (Nyssa biflora), loblolly pine (Pinus taeda), sweet gum (Liquidambar styraciflua) and red maple (Acer rubrum).

Also found on these small islands and within the adjacent forests and marshes are the canebrake rattlesnake (Crotalus horridus atricaudatus) and the Dismal Swamp southeastern shrew (Sorex longirostris fisheri). These two animals are found throughout the riverine ecosystem and particularly at the 'edges' or habitat interfaces. The canebrake rattlesnake, which inhabits only a small portion of southeast Virginia, is state listed as endangered. Its numbers are decreasing rapidly though, due to habitat loss and deliberate molestation and destruction by people. This snake feeds

primarily on grey squirrels and cotton-tail rabbits, but spends large amounts of time resting in cypress swamps in or near the water (Savitsky, pers. comm.). Canebrake rattlesnakes are live-bearing snakes, they give birth to one to two litters per year; and they spend approximately four to five months in underground hibernacula during the winter. The canebrake rattlesnake suffers greatly from public fear and paranoia and misidentification with the more aggressive and more visible, eastern cottonmouth. The canebrake rattlesnake is generally reclusive and non-aggressive (Savitsky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The Dismal Swamp southeastern shrew (Sorex longirostris fisheri) which also inhabits only a small portion of southeast Virginia, is listed as Threatened at both the State and Federal level. The shrew is a tiny mouse-like mammal that spends much of its time under and around decaying logs and stumps. Because shrews are insectivores, the primary food sources of this animal are spiders, earthworms, grubs and other insect larvae. It is believed that they bear one to two litters of young per year, but because shrews are small and secretive, much of the biology and natural history of these animals remains unknown. Principle threats to these animals are habitat destruction and loss; and habitat alteration which allows interbreeding with the more common upland shrew, the southeastern shrew (Sorex longirostris longirostris).

PRIMARY ECOLOGICAL BOUNDARY:

The primary ecological boundary encompasses the two rare vegetative communities (mid-height herbaceous wetlands and submesotrophic forests) and the occurrences of rare plant and animal species and their respective potential habitats.

The main purpose of the primary ecological boundary is to delineate and encompass known occurrences of targeted resources at the site, as well as the existing and potential habitats. Inclusion of some additional marshes north and south of the Northwest River channel provides excellent restoration potential for wetland plant species, with active management. The upland islands found within this boundary are existing critical habitat for the rare vertebrate species at the site.

The primary ecological boundary follows the channel of the unnamed northern branch of the river northwest and then turns northeast to include wetlands up to Route 168. From there the primary boundary either coincides with the secondary ecological boundary, or is followed closely by it, as the primary boundary encompasses the bottomland forests along the northern edge of the site. Both boundaries cross the VA Power cleared right of way, and extend for a short distance west before turning sharply south. Along the southwestern and southern edges of the site, the primary ecological boundary encompasses the forested swamps and wetlands. Near the community of Northwest, the primary ecological boundary was drawn

to encompass critical natural heritage resource habitats, while skirting residential and business dwellings.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes the primary ecological boundary and some additional buffer lands intended to mitigate natural and human threats to the natural heritage resources. These buffer areas should also provide administrative and managerial access.

Inclusion of several drainages and associated lands north of the un-named branch of the Northwest River provide vegetated buffers for the lower headwater area of that branch. Water quality and maintenance of the normal hydrology of the area are crucial for plants such as the aster-like boltonia, and epiphytic sedge, found further downstream.

The secondary ecological boundary follows the primary ecological boundary closely except along the eastern and southwestern edges of the site. In these areas, the secondary ecological boundary is expanded slightly to include additional minimal buffer zones critical to the health and maintenance of the integrity of the marshes.

The Northwest River actually originates from groundwater and drainage from the southern half of the historic Dismal Swamp and from the existing swamp as well. It is important that the connectedness of this ecosystem be strongly considered in all conservation planning. The primary and secondary ecological boundaries which separate the Upper Section site from the remainder of the Northwest River drainage up to the Dismal Swamp are somewhat arbitrary boundaries which delineate the northwestern boundary of this site just north (upstream) of the entrance of the northern branch of the river. Many of the natural heritage resources undoubtedly occur throughout this riverine ecosystem and for comprehensive conservation planning, boundaries described in the Northwest River Macrosite report should be strongly considered. Boundaries for the Northwest River Macrosite include the standard conservation sites and coincide with the southeastern side of the Great Dismal Swamp National Wildlife Refuge (GDSNWR).

On the southeastern edge of the Upper Section site the secondary ecological boundary abuts Route 168. At this point the Upper Section site is 'adjacent' to the Southwestern Marshes site, separated only by the bridges for Route 168 and the railroad trestle. The protection of these sites would result in the conservation of a large, contiguous portion of the Northwest River ecosystem which supports many rare species of plants and animals.

The inter-relatedness of this system must be emphasized. It is important to note that this conservation site and others, are only pieces of a much larger natural area. They are of course, integral

parts of a large riverine ecosystem, but for the sake of consistency with the APES inventory report, they have been described separately. Some of the boundaries are obviously political/ownership boundaries, and it should be noted that the ecosystem, which is of primary importance, is not and can not be partitioned in these ways. It is important to view the Northwest River, the Great Dismal Swamp and the associated conservation sites as a whole, dynamic ecosystem.

PRIMARY AND SECONDARY ACREAGE:

Primary acreage (acreage within primary ecological boundary)- 1530 acres.

Secondary acreage (acreage within secondary ecological boundary)- 356 acres.

Total acreage recommended for protection- 1886 acres.

TRACTS:

Number of ownership tracts within site: forty-two.

Number of ownership tracts within the primary ecological boundary:

Thirty one tracts are all or partially within the primary ecological boundary.

ONSITE AND OFFSITE CONSIDERATIONS:

Surrounding land use here is primarily agricultural and silvicultural. Much of the land identified within the primary ecological boundary is bottomland forest, past use has probably been primarily hunting and fishing. Residential or agricultural development and large tract, clear-cut timbering in the immediate area could be serious offsite considerations which may influence the integrity of the marshes and future management activities. Best management practices designed to avoid soil compaction and excessive sedimentation should be adhered to for all activities within this area.

The Northwest River was identified in the Nonpoint Source Pollution Watershed Assessment Report as having a high probability (H1) for pollution impacts. Pollutants are identified as nutrient loadings from agricultural land.

This area lies entirely within the City of Chesapeake. It is within hydrologic unit HUC 03010205, watershed K04 (Wilson, 1993). The City Comprehensive Plan (Curtis, 1990) has designated the Northwest River a "conservation area", primarily because the Northwest River is the main source of the city's surface water. Although the city has several wells, all surface water is drawn off of the Northwest River at an out-take location just east of the Battlefield Boulevard Bridge (which is just downstream of this site). The Comprehensive Plan defines the City's plans to monitor and control the quality of the water in the Northwest River by the following four principles:

1. Promotion of the Northwest River's special characteristics

and the need for water quality management.

2. Exclusion of activities which threaten the water supply from the basin, or at least the portion of the basin near the intake.
3. Constant monitoring of the river to ascertain water quality conditions.
4. Control and monitoring of land use activities; the institution of good land management practices.

In 1987 the City of Chesapeake entered into a contractual agreement with the City of Virginia Beach whereby Chesapeake would share in the development, cost and ownership of the Lake Gaston water resource project. This project and all ensuing agreements are proceeding slowly due to a great deal of citizen and political opposition to the project.

Common reed (Phragmites australis), a potentially invasive marsh grass occurs in some of these marshes. In this portion of the Northwest River however, it fails to form dense stands and does not presently appear to be a problem. If this plant does increase in these marshes, the increase will likely be the result of hydrologic perturbations or similar disruptions.

MANAGEMENT RECOMMENDATIONS:

Woody species such as red maple, swamp rose and wax myrtle seem to be increasing in some of the marshes, and less frequent fire is probably contributing to this woody plant invasion in these areas. Fire history studies will help determine appropriate fire regimes for this area, and it is recommended that Department of Conservation and Recreation stewardship personnel develop and implement a fire management plan for the wetlands under protective ownership.

Water level, water quality, and the withdrawal/use situation in the City of Chesapeake should be monitored carefully.

Continued monitoring of the stands of common reed (Phragmites australis) is necessary. In some parts of the Northwest River this grass does not appear to be increasing, while in other sections it is forming large dense clones. This species should be closely monitored, and disturbance to the wetland vegetation (which favor common reed) should be avoided. An interagency reed-grass control project is currently underway which evaluates stands of common reed along the Northwest River. Some limited control work with an herbicide and prescribed fire management is being conducted this year, and monitoring of these and additional stands will continue. An invasive species eradication control plan needs to be developed for the Northwest River and specifically for the sites supporting rare and endangered species of plants and animals.

PROTECTION RECOMMENDATIONS:

These wetlands have been recommended for inclusion within the Virginia Natural Area Preserve System. Acquisition is recommended for some land within the primary ecological boundary, and negotiations with several landowners are underway. The land included within the secondary ecological boundary need not be acquired, but the maintenance of this area as a protected buffer is important to the continued preservation of the natural heritage resources. For this reason, management agreements and landowner agreements are recommended for the land encompassed by the secondary boundary.

Access for canoeing or interpretive trails could be obtained at several different locations either along Route 168 or from Ballahack Road to the south. Administrative and managerial access may be achieved at the same locations, or from one of several additional points located along the eastern or southeastern edges of the site. The proximity of the Upper Section site to the Great Dismal Swamp, the Southwestern Marshes site and the many other nearby significant lands makes this site extremely important in the preservation of the Northwest River watershed.

INFORMATION NEEDS:

Further plant and animal inventories are needed at this site to verify historical records and to update existing data. Additional research is needed into the status and health of the existing populations of the Dismal Swamp black bear (Ursus americanus) and the eastern big-eared bat (Plecotus rafinesquii).

RECREATIONAL, SCENIC AND EDUCATIONAL CONSIDERATIONS:

It is recommended that the City of Chesapeake:

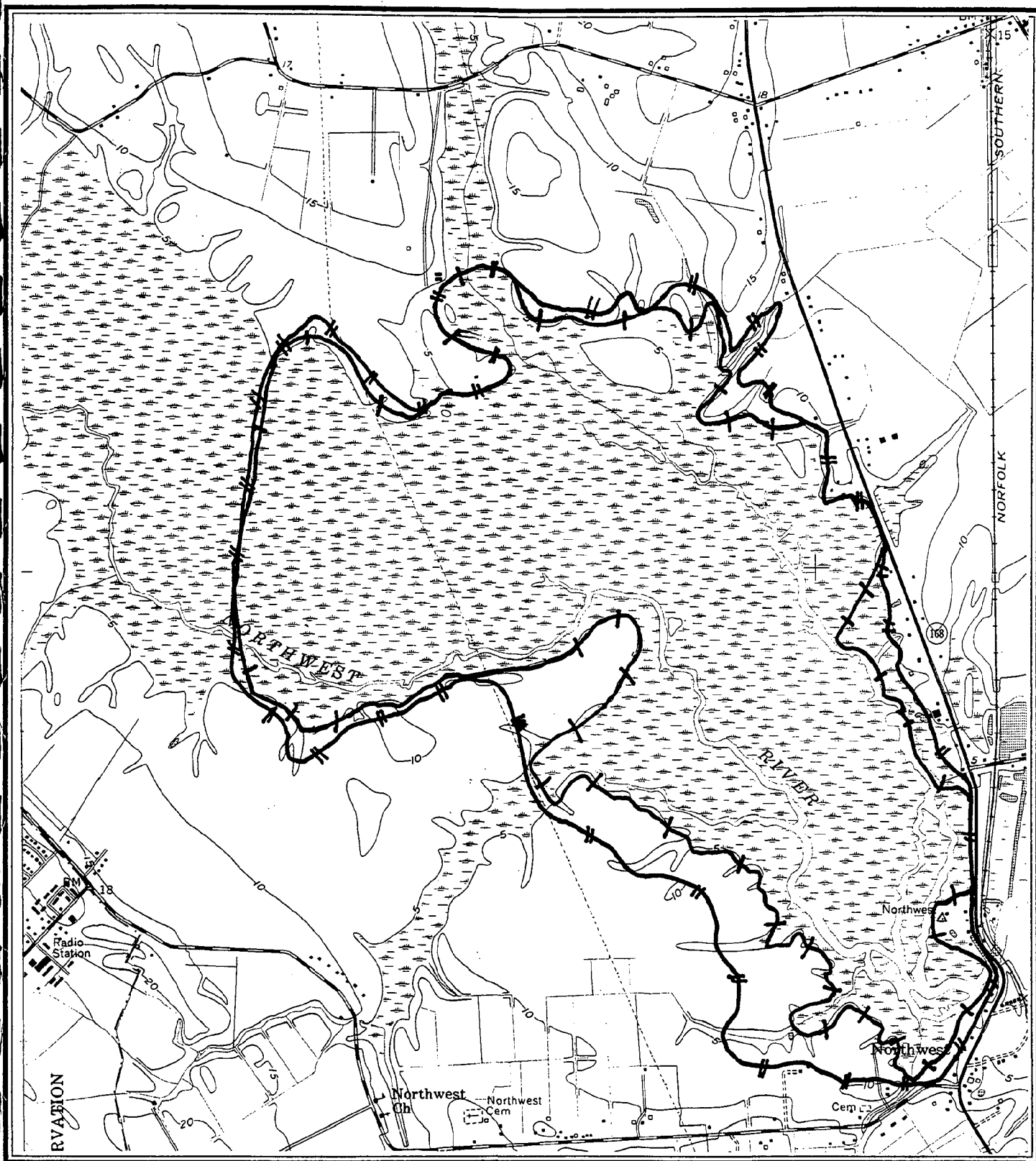
- Provide an educational program which focuses on natural resources within the area.

- Make local developers aware of the natural resource issues which are relevant to the area and encourage them to include public interpretive opportunities and conservation mechanisms in design plans for the area.

The Northwest River is currently under consideration for inclusion in the Virginia Scenic Rivers System. The river has received several recommendations as such, and is scheduled to be evaluated in the future.

The Northwest River is included in the "Public Access and Visual Assessment for the North Landing River Watershed" planning study. This study is a planning study funded in part by the Coastal Zone Management Program, which is administered by the Department of Environmental Quality (DEQ), through a grant of the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management. The purpose of this study is to

evaluate the North Landing and Northwest Rivers for potential public access opportunities and to study the visual components contributing to these scenic waterways.



SITE NAME: NORTHWEST RIVER UPPER SECTION
USGS 7.5 QUADRANGLE: MOYOCK
SCALE: 1:24,000



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LOCAL OPTIONS FOR CONSERVING NATURAL AREAS

Virginia Council on the Environment

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This report was prepared by staff of the Virginia Council on the Environment at the request of the Department of Conservation and Recreation. It is a general guide to the land management options available to local governments in Virginia for conserving natural areas. The report is for use in conjunction with the Division of Natural Heritage report, Conservation Planning for the Natural Areas of the Lower Peninsula, which contains detailed information on identified natural areas in James City and York Counties, and the City of Williamsburg. The Natural Heritage report is the final product of a multi-year effort to survey and promote protection for important natural areas in the subject localities. The Natural Heritage survey was conducted at the request of local officials. The concepts presented here are applicable throughout Virginia and can be used for natural area conservation planning in any state locality.

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LOCAL OPTIONS FOR CONSERVING NATURAL AREAS

I. Introduction

This report describes options available to Virginia localities for conserving natural areas identified through a natural heritage resource inventory. Natural heritage resources are "the habitat of rare, threatened, or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest" (Virginia Natural Area Preserves Act, *Virginia Code* §10.1-209 et seq.). Natural areas are determined based on an inventory, conducted by the Department of Conservation and Recreation's Division of Natural Heritage, which systematically identifies natural heritage resources and the land area necessary to protect them.

Natural areas are increasingly threatened by the cumulative effects of human activities which alter the natural environment. Habitat disturbance, fragmentation, or destruction is occurring as a result of encroaching urban development as well as logging, agriculture, and surface mining. The conservation techniques described in this report can be used in various combinations to prevent the loss of important natural areas and provide a comprehensive local natural areas protection program.

In describing natural area boundaries, staff scientists from the Division of Natural Heritage consider a number of factors including;

- the extent of current and potential habitat for important biological communities,
- species migration corridors, and
- buffer requirements to maintain surface and ground water quality and quantity within the site, and exclude or control problem species.

Using these guidelines, a preserve design is prepared for each natural area which generally consists of two zones: a core reserve, and a buffer zone. Each zone has its own special planning considerations. In general, the core reserve requires the highest level of protection. A buffer zone around the core protects it from outside threats and encroachments. This buffer may still be used in a low intensity manner if appropriate performance standards are applied. The specific requirements of each

zone may vary from site to site, based on the characteristics and needs of the resources found there.

The primary goal of a local natural areas program is to conserve natural heritage resources. Other benefits of preserving these natural areas include providing habitat for other, more common species, as well as providing opportunities for recreation, education and research. In order to better integrate natural area conservation into the local decision process, complementary goals should be to protect these resources in ways that do not impose unfair restrictions on private property, and that serve as an asset for local economic and community development efforts.

Most efforts to date to conserve natural heritage resources have focused either on state and federal regulations or traditional non-regulatory options such as acquisition or easements. These most commonly used methods are discussed in the next two sections of this report. There is also, however, a growing trend toward increased local government involvement in natural area conservation. An enhanced local role can fill the gaps where federal and state programs are unable to limit habitat loss from land development and other activities which fall under the purview of local programs. Information on the location of natural areas can assist localities in planning for community development and implementing local land management programs. These options for managing development are also discussed later in this report.

A key principle for a successful local natural areas program is to integrate natural heritage resource conservation into the planning and land management process in a way that considers local circumstances and accommodates community development. There is no single approach for natural area conservation that is appropriate for all localities. An appropriate program is determined by local conditions such as population density, anticipated growth, the extent and value of natural areas, public awareness of the issue, and the general vision the community has for its future. Each strategy has advantages and disadvantages in different situations and for different localities. Certain local governments will choose to emphasize one approach over another. The most effective local programs, however, will likely consist of a combination of strategies and management techniques. These issues will be discussed in the last section entitled "developing a natural areas conservation program".

II. State and Federal Regulations

State and federal mandates play an important role in conserving natural heritage resources. Some, such as state and federal endangered species laws, are directed specifically at protecting these resources. Others are focused on managing significant lands such as wetlands, beaches, or Chesapeake Bay Preservation Areas which may contain natural heritage resources or be closely tied to the well being of these resources. Still others, such as the National Environmental Policy Act and Virginia's Environmental Impact Review Process are designed to identify and manage the effects of proposed public facilities, including impacts to natural heritage resources. Taken together, these mandates can provide an important component of a comprehensive natural area conservation program.

State and Federal Laws Protecting Rare Plants and Animals

Virginia's natural heritage includes a number of species which are listed or proposed for inclusion on the state or federal endangered or threatened species lists. Several protection measures are afforded to listed endangered and threatened species such as systematic surveys, preparation and implementation of recovery plans, permit review, land acquisition and other species conservation actions.

Virginia has two laws designed to protect endangered species. The Virginia Endangered Species Act (*Virginia Code* §29.1-230 et seq.) was passed in 1972 and is administered by the Department of Game and Inland Fisheries. This legislation prohibits the taking, transportation, sale, etc. of endangered and threatened animal species, except by permit. Virginia's Endangered Plant and Insect Act (*Virginia Code* §3.1-1020 et seq.) was passed by the General Assembly in 1979 in order to extend protection and management to endangered and threatened species of plants and insects. This act is administered by the Department of Agriculture and Consumer Services and prohibits the taking or possession of listed species except from a person's own land or by permit.

The U.S. Fish and Wildlife Service administers the federal Endangered Species Act, which was passed in 1973. The Fish and Wildlife Service's regulations promulgated pursuant to this act prohibit the taking of any endangered species including significant modification or degradation of their habitat. Cooperative agreements for the implementation and enforcement of provisions of the federal Endangered Species Act have been signed by the U.S. Fish and Wildlife Service with

the Department of Game and Inland Fisheries and the Department of Agriculture and Consumer Services.

Environmental Impact Review

Environmental review affords an important opportunity to provide early comments on the potential impacts to natural heritage resources from proposed federal and state development projects. Projects proposed, funded, or permitted by a federal agency may require some level of environmental review under the National Environmental Policy Act (NEPA). Under this act, any federal agency proposing, funding, or granting a permit for an activity which could affect a threatened or endangered species must consult with the U.S. Fish and Wildlife Service. The rules governing the federal environmental impact process require that federal agencies contact affected state and local governments in preparing and reviewing federal documents. The Council on the Environment is the coordinating agency for the Commonwealth of Virginia for federal environmental documents, with the exception of road projects.

The Commonwealth of Virginia also requires an environmental review of major state-funded projects. The Virginia Environmental Quality Act (*Virginia Code* §10.1 - 1200 et seq.) requires that any state agency or institution proposing to construct facilities costing more than \$100,000 must prepare an environmental impact report and submit it to the Council on the Environment. If there is a possibility that natural heritage resources will be affected by a state project, the Division of Natural Heritage will be asked to comment. The impacts to natural heritage resources must be described in the environmental impact report along with measures to avoid or minimize these impacts. Following a review of the project, the Council provides comments to the Governor prior to authorization for project funding. Unlike the federal NEPA, state legislation does not require state agencies to prepare an environmental impact report before issuing permits to private parties.

Certain agencies and organizations submit permit applications and project notices directly to the Division of Natural Heritage in response to various mandates beyond the coordinated review programs described above. These include the Virginia Department of Transportation, the Virginia Marine Resources Commission, the State Water Control Board, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and other permitting and regulatory agencies, along with some private concerns. Again, the objective of this review is to protect natural heritage resources

by avoiding or minimizing impacts to the resources. The Division of Natural Heritage reviews these proposals and makes recommendations to assist in planning efforts.

State and Federal Regulation of Significant Areas

State and federal regulations apply to certain classes of environmentally significant areas which may contain or be closely linked to natural heritage resources. These include wetlands, dunes, beaches, and Chesapeake Bay Preservation Areas. These areas provide rich habitats and often have a higher than average likelihood of supporting rare species. Although natural heritage conservation may not be the sole or primary purpose for protecting these areas, applicable regulations can form an important component of a comprehensive local natural areas program.

Wetlands, both tidal and non-tidal, have a number of important physical and biological functions, including providing important habitat for many rare and endangered species. Nationally, almost 35 percent of protected animal species are found in wetlands, although wetlands cover only about 5 percent of the nation's land area. In Virginia, over 50 percent of our rare, threatened, or endangered plant species are found in wetlands.

State law regulates the use of tidal wetlands in Virginia (*Virginia Code* §28.2-1300 et seq.). This law is administered cooperatively by local wetlands boards and the Virginia Marine Resources Commission. A permit from the local wetlands board is required prior to starting construction, dredging, or filling a tidal wetland. Permits are to be issued only if the proposed activity would not violate the intent and standards of the law and the benefits of the activity exceed its detriment. One of the standards listed in the law is that "wetlands of primary ecological significance shall not be altered so that the ecological systems in the wetlands are unreasonably disturbed."

Non-tidal wetlands are regulated under Section 404 of the Clean Water Act (1977), administered by the U.S. Army Corps of Engineers. The Act prohibits disposal of dredged material or placement of fill material into "waters of the United States," which are interpreted by the Environmental Protection Agency to include most non-tidal wetlands. Section 401 of the Act gives states the authority to review the 404 permit applications (as well as other federal water permits or license requests), and to certify accordance with state water quality standards and policies. As a result of 1989 Virginia legislation, the state has strengthened its 401 certification program through the issuance of a Virginia Water Protection Permit.

Beaches and coastal primary sand dunes in Virginia are regulated by *Virginia Code* §28.2-1400 et seq. This law is administered in similar fashion to the wetlands law and requires a permit for any dune or beach disturbing activity above the mean high water mark. Beaches below the mean high water mark are regulated by the wetlands law.

The Chesapeake Bay Preservation Act (*Virginia Code* §10.1-2100 et seq.), although enacted to protect water quality, has provisions which can help conserve natural heritage resources. The Chesapeake Bay Preservation Area Designation and Management Regulations are administered by the Chesapeake Bay Local Assistance Department and implemented by local governments in the Tidewater region of Virginia. The regulations require local governments to designate tidal and contiguous non-tidal wetlands, tidal shores, and at least a 100 foot buffer as Resource Protection Areas. Development or alteration of these areas is, in most cases, prohibited. Adjacent lands which may affect water quality are designated as Resource Management Areas. Land uses in these areas must meet specific water quality protection criteria.

The regulations that apply to each of these environmentally significant areas can be instrumental in protecting natural heritage resources. It is important to recognize, however, that these programs were not designed solely to conserve natural heritage resources. In some cases, the regulations may permit activities which are detrimental to these resources. For example, non-tidal wetlands such as bottomland hardwood areas may be logged under current regulations, thus severely altering the ecosystem. This does not mean that the regulations have no value for habitat protection, but rather that it may be necessary in some cases to use other management techniques in addition to the applicable regulations.

III. Non-regulatory Options

The state and federal regulatory programs described above may afford protection against some of the threats to natural areas. More than likely, however, they will not by themselves provide sufficient conservation measures to fully protect a natural area. In order to provide comprehensive natural area conservation, other protection techniques need to be used as well. An integral part of a comprehensive natural area conservation program will be effective partnerships among the various parties having influence over activities that affect the target resources. Landowners,

businesses, developers, environmental groups and citizens in general need to be included in this partnership along with local and state government. This section describes some techniques that can be used for building partnerships to conserve natural areas through non-regulatory means.

Acquisition

Fee simple acquisition is one of the oldest and most direct strategies for conserving natural areas. Natural areas can be acquired by the federal, state, or local governments, or by private concerns. Funds to acquire these areas can also come from some combination of these groups. There are hundreds of natural areas in need of protection in Virginia. Because funds are limited and land is expensive, only a small percentage of the most biologically important natural areas can be protected through outright acquisition by the state and federal governments or by private conservation organizations. Still, acquisition can play an important role in local natural area conservation and can be particularly effective if local governments, businesses, and conservation groups take an active role in acquiring important properties.

In some cases land acquisition may be the only realistic option for preserving significant natural areas. For instance where parcels lie entirely within an important natural area, conservation might require a difficult compromise between habitat preservation and reasonable use of the land. Where the owner is interested in altering land in ways detrimental to the natural heritage resources, some form of acquisition may be the most appropriate preservation technique. The property could be acquired by the local government, a private environmental group, or a coalition of interests including businesses and private citizens.

There are a number of options, and combinations of options, available for acquiring and maintaining important natural areas. The simplest option is for the local government to purchase property with either general funds or through a local bond issue. This option, of course, requires strong support from local citizens. Local government funds can also be used as "seed money" to attract contributions from businesses, citizen groups and private individuals, or to be used as a match for other grants. Funds may also be available on a competitive basis from the state or federal governments and national conservation organizations. In addition to fee simple purchase of property, these funds could also be used to protect natural heritage resources by leasing land. This technique can be a more cost effective use of funds if

the property owner is interested in such arrangements.

Acquisition of important natural areas can provide a core from which to build a more comprehensive open space network. It may also encourage nearby property owners to preserve their land through other techniques such as those discussed below.

Conservation Easements

Conservation easements are legally enforceable agreements between a landowner and a government agency or conservation organization that place restrictions on the present and future use of land. State agencies and local governments can hold easements, or property, under the provisions of the Open Space Land Act (*Virginia Code* § 10.1-1700 et seq.). The Virginia Outdoors Foundation, which was created to accept and hold gifts of open space land, also accepts easements (*Virginia Code* § 10.1-1800 et seq.). Non-profit conservation organizations can hold conservation easements under the provisions of the Virginia Conservation Easement Act (*Virginia Code* § 10.1-1009 et seq.). An easement can run for a term of years or can be a perpetual easement to be observed by the present and future owners of the land. Easements are attractive for both the conservation-minded landowner as well as the agency or conservation organization. The restrictive terms of the easement are entirely negotiable between the parties involved. The present and future landowners continue to enjoy many uses of the property while the agency or conservation organization achieves their conservation goals for the site. There are also financial benefits for the donor of the easement such as a possible reduced assessment for real estate purposes, a charitable deduction for state and federal income tax purposes, and reduction of federal estate taxes and Virginia inheritance taxes.

Dedication of Natural Area Preserves

The Virginia Natural Area Preserves Act authorizes the Department of Conservation and Recreation to accept the dedication of qualified natural areas into the Virginia Natural Area Preserves System. Natural area dedication is the strongest form of protection that can be afforded a natural area. It involves recording a legally binding agreement which states the conservation purpose of a property and grants a conservation interest to the Department. The terms of a dedication agreement can be similar to those of a conservation easement and should state intentions for the use of the property, its management, development, and possible public uses. The dedication

agreement is recorded with the deed of the property and is perpetual. The Natural Area Preserves Act allows any private landowner, state agency, or other public body (other than federal) to dedicate their lands as natural area preserves. Private landowners may dedicate their property as a natural area preserve and still maintain ownership and all rights to sell or otherwise transfer title to the property. In addition to the satisfaction of preserving important natural resources, the same financial benefits offered the donor of a conservation easement are available to a private landowner who dedicates land as a natural area preserve.

Natural Areas Registry and Management Agreements

The Virginia Natural Area Preserves Act also authorizes the Department of Conservation and Recreation to maintain a state registry of voluntarily protected natural areas. The Division of Natural Heritage is initiating a registry program for voluntary conservation of publicly and privately owned natural areas. Natural Area registry agreements will be sought on private, state, and federal lands. Participating landowners receive a plaque that recognizes the significance of the property and its placement on the Department's Natural Area Registry. In return, the landowner offers voluntary protection for their property and agrees to notify the Department of Conservation and Recreation of any intent for ownership to change hands, as well as the condition of the natural heritage resources on the land. In return for this voluntary protection, a landowner receives the personal satisfaction of knowing that they have contributed to a statewide natural area conservation effort. Landowners also receive advice and assistance with site and species management and monitoring, and other assistance from the Department of Conservation and Recreation relating to natural area conservation.

A management agreement is a contract between the landowner of a natural area and an agency or conservation organization to achieve specific conservation objectives. Management agreements are designed to clearly state the desires of the landowner and the conservation group in regard to the conservation intent for the site and the duration of the agreement. These agreements can be used to conserve natural areas on either publicly or privately owned land. A natural area management agreement may be an effective conservation option alone, or may be used in conjunction with some other technique such as natural areas registry.

Tax Incentives

Under the "Land Use Assessment Law" (*Virginia Code* §58.1-3230 et seq.) a locality may, at its own option, adopt a program of preferential assessment for lands devoted to agriculture, horticulture, forestry, and open space uses. In localities which adopt this program, real estate which meets qualification standards formulated by the State Land Evaluation Advisory Committee is assessed by local officials according to its "use value" as opposed to its fair market value. Such assessments promote the conservation of open space by ameliorating pressures which might otherwise force a property's conversion to more intensive use.

The Agricultural and Forestal Districts Act (*Virginia Code* §15.1-1506 et seq.) allows farm or timberland owners to voluntarily form agricultural or forestal districts. These are areas in which landowners declare their intention to maintain their land in agricultural or timber harvesting for a period of five to eight years. Although the primary goal of this legislation is to preserve the economic production aspects of these lands, the act also states that the areas will serve to "conserve and protect agricultural and forestal lands as valued natural and ecological resources which provide essential open spaces for clean air sheds, watershed protection, wildlife habitat, as well as for aesthetic purposes." In return for entering into a district agreement, landowners receive certain financial incentives and protection from development pressures. Landowners in an agricultural or forestal district are automatically eligible for use-value assessments for property taxes. Limitations are placed on the expenditure of public funds for infrastructure expansion in districts as well as restrictions on the acquisition of land through eminent domain. Local governments rezoning parcels next to agricultural and forestal districts must also consider the existence of these districts in their decision making.

Although agricultural and forestal districts do not prohibit all activities which may be detrimental to natural areas, they can help reduce development pressures and provide some buffering from development. In this respect, these districts would be most valuable when combined with some form of acquisition, such as conservation easements, for the most important natural areas within a district.

IV. Managing Development

Non-regulatory protection options, used in combination with state and federal regulations, can provide a strong core for a local natural area conservation program. But these regulations and agreements, although valuable components, do not by themselves represent a comprehensive natural areas program and probably cannot protect all of the natural areas in a locality. State and federal regulations will not apply to all of the land within most natural areas. Non-regulatory protection options are limited by available funds and by the wishes of current landowners. In order to supplement these strategies and develop a more extensive system of protected natural areas, local governments should use their land management authority to harness the development pressures threatening natural areas. Development proposals can then actually be used to conserve these areas. To accomplish this objective, a strong natural area conservation component in the comprehensive plan is essential. The plan can provide a blueprint for natural area conservation which can be implemented through several different flexible zoning techniques. This section describes these planning and land management mechanisms which are available to localities for conserving natural areas by managing development.

Comprehensive Planning

All localities in Virginia are required to adopt a comprehensive plan. Comprehensive planning provides a means for anticipating and influencing changes occurring within a community. Comprehensive plans include information on existing conditions, community goals and objectives, and strategies for attaining the community's vision for its future. Conserving natural areas should be an integral part of this vision.

With regard to natural areas, deciding how to best display the occurrence of rare species populations is a matter of some debate. A natural areas inventory will provide detailed information on natural area boundaries, as well as a description of the natural heritage resources within the area and their location and management requirements. The debate occurs over how much detail should be given in comprehensive plans available to the public. There is some concern that including details on species location may invite harm to those species from collectors or by landowners wishing to remove what they may see as an obstacle to achieving their goals for their property. On the other hand, limiting the level of detail to very general location information also limits the usefulness of the information for planning purposes. Some have argued that very general location information is sufficient and

that precise location data should be reserved for local staff review of development proposals. This strategy has limitations, however, because it does not encourage developers to consider sensitive resources as they design developments. Each locality must decide how to best balance these risks and opportunities.

There is no debate, however, over the value of developing strong comprehensive plan goals and objectives for conserving natural areas. The comprehensive plan can be a powerful tool for coordinating a comprehensive natural area conservation program. A goal is an end towards which community actions are aimed. An objective is a measurable activity to be accomplished in pursuit of that goal. The final part of the natural area planning process is to develop conservation strategies. Strategies are specific proposals for accomplishing an objective. Strategies to employ for attaining natural area conservation objectives should include the non-regulatory and development management options described in this report. These strategies, when added to applicable state and federal regulations, form a well balanced and comprehensive natural area conservation program.

One planning strategy for natural area conservation is to incorporate natural areas into a comprehensive open space plan. Open space planning involves identifying open spaces and recommending strategies to conserve these areas through various land management techniques. An open space plan may address conservation of many important community features, including natural areas, historic sites and districts, scenic routes and rivers along with their adjacent "viewsheds", national, state or local parks and forests, other environmentally sensitive areas such as wetlands and steep slopes, groundwater recharge areas, and public reservoir watersheds. In addition to their primary purposes, these areas may provide opportunities for recreation and education. Open space planning can also help guide growth and result in a more orderly community.

The cultural and recreational value of open space can be amplified by connecting various resources through a system of greenways. Greenways are linear corridors of private and public lands and waters providing access to open space and other recreational resources. These corridors can also be used to connect rural open spaces with more urbanized areas. Often abandoned rail lines, utility right-of-ways, scenic routes, rivers, and stream floodplains are used as greenways. If greenways contain a sufficient amount of undisturbed vegetation, they may also add to the habitat value of the natural areas they connect by providing a natural corridor between them. Habitat corridors among natural areas provide avenues of movement for species and help keep populations genetically healthy.

To help incorporate the concepts of natural areas, open space, and greenways into the planning process, various natural and cultural resources can be assembled into a single data base. Although not a necessity, a computerized geographic information system (GIS) can make it easier to manage such a data base. A GIS can be useful in land management decisions such as rezoning requests by providing a quick reference on the natural resources that will be affected by a particular decision.

The combined benefits of open spaces and greenways make it easier to justify conservation of significant resources in the face of expanding suburban growth. In addition to conserving valued natural and cultural resources, they provide a valuable community asset which contributes to a higher quality of life. As a community asset, these areas can have the added benefit of enhancing local economic development and tourism efforts. To achieve these many benefits, however, the strategies identified in the comprehensive plan must be implemented through local land management authority such as zoning.

Conventional Zoning

State law enables localities to use their zoning authority to protect open spaces (*Virginia Code* §15.1-486), and to provide for the preservation of "lands of significance for the protection of the natural environment" (*Virginia Code* §15.1-489). State law also cites conservation of natural resources as one of the matters to be considered in drawing and applying zoning ordinances and districts (*Virginia Code* §15.1-490).

Conventional zoning can be used for natural area conservation, however it has some limitations. In general, conventional zoning by itself does not offer the flexibility needed to protect natural areas while allowing reasonable use of private property. Conventional zoning typically only classifies land uses and regulates development density. It does not provide the flexibility to conserve sensitive natural areas while allowing appropriate development in other, more suitable portions of a tract. Classifying large tracts of land for natural area preservation would require strict limits on development and may prohibit most uses of land within that zone.

Limiting development to very low densities through large lot zoning also presents problems. Although the number of dwelling units may be an appropriately low intensity for protection of the natural area, no actual protection is afforded to living resources since they are subject to the will of individual property owners. Large

lot zoning may actually cause more rapid loss of natural areas because more land is required to meet the demand for development.

Flexible Zoning

Other more flexible zoning techniques are available for conserving natural areas. These include overlay zones, cluster and planned unit development provisions, and conditional zoning. These techniques can be used in conjunction with conventional zoning and incorporate guidelines for preserving natural areas and open space into the development review process. They can encourage sensitive site design which conserves natural areas without sacrificing other objectives. Each of these techniques can be used to provide more flexibility because they offer an opportunity for negotiation regarding site design.

Overlay zones are special districts that are placed "on top of" portions of other conventional zoning districts. The development standards for the overlay zone are then added to the standards of the original zones. Overlay zones can be used to outline natural areas or land designated for open space preservation. Within this zone, developments can be required to provide a certain percentage of open space or meet certain design standards which increase the viability of natural areas. Overlay zones can also include provisions for density bonuses for clustering development and preserving open space.

Cluster development encompasses many techniques that allow moderate to high density development in exchange for conservation of open space and natural areas. Clustering is an excellent way to preserve open space by minimizing the amount of land needed for development. Development costs are usually lower because fewer streets are needed and water and sewer systems can be made more compact. By concentrating development on the most suitable portion of a tract, open space, including natural areas elsewhere on the tract, can be preserved.

A planned unit development, or PUD, is a form of clustering, but is generally larger and can include non-residential land uses. Planned unit development regulations set an average development density for large tracts and then permit higher density and cluster development on selected portions of the tract. The more intensely developed areas are off-set by areas with little or no development. Clustering of both residential and non-residential uses can be done within a PUD, thus yielding benefits to the developer while conserving open space and natural areas. Many PUD

regulations appear as floating zones which are not designated on a zoning map. This allows more flexibility for the community to reserve judgement on placement of such large developments until a request is received.

Conditional zoning is a procedure that allows localities to accept conditions proffered (voluntarily offered) by an applicant for a rezoning. Proffered conditions are commitments, not required by the zoning ordinance, to limit how the property is to be used or to provide facilities to meet the needs of the area being rezoned. Under conditional zoning, developers could proffer to leave important natural areas undeveloped and assure the protection and management of these areas. Other measures to protect natural areas could also be proffered such as stormwater management facilities to protect the water quality of sensitive aquatic habitats, or water dependent terrestrial species and communities.

The purpose of conditional zoning is to add flexibility to the way zoning is practiced. It allows applicants to proffer conditions that make the proposed rezoning more acceptable to the community. Conditional zoning enabling legislation (*Virginia Code* §15.1-491.1 et seq.) requires that proffers must relate to the rezoning and conform with the comprehensive plan. Upon approval, conditions become legally binding on the property and are enforced by the zoning administrator.

Transfer, Purchase and Lease of Development Rights

Another mechanism which holds promise for the future is the transfer, purchase or leasing of development rights. Current state law does not allow the transfer of development rights between parcels of land, however a number of efforts have been made to promote this legislation. Where such systems have been used in other states, owners of designated open space have been assigned development rights according to a formula based on the amount of land owned in the area where development is to be restricted. Landowners in these designated areas may not develop their land, but may transfer, sell or lease the development rights while keeping the land itself. Once the development rights are gone, the land may be used only for limited purposes such as open space conservation, agriculture or forestry and is taxed accordingly.

The development rights removed from these "sending" properties can then be used to increase allowable density on other more suitable properties. In some cases, the community itself may obtain development rights from property owners in order to restrict growth while, at the same time, providing compensation to those property

owners. Advocates of the use of development rights see them as the most effective and equitable way yet devised to conserve open space in areas experiencing rapid growth. Although the transfer of development rights alone does not assure habitat protection, it can be used in combination with other non-regulatory techniques such as easements to conserve natural areas while providing compensation to landowners.

V. Developing a Natural Areas Conservation Program

The various techniques described in this report present a broad spectrum of options for local governments to use for conserving natural areas. Beyond addressing natural area conservation in the local comprehensive plan, there is no one technique, or combination of techniques, that is best for all natural areas or all localities. A local strategy must consider a number of variables. This section describes these variables and their relation to conservation strategies.

Local governments must adopt strategies for individual natural areas that consider the characteristics of each site. An initial step should be to prioritize natural areas according to their natural values and risk of loss from development. The natural areas inventory provides information on the natural heritage value of each area. This information should be combined with details on other natural values such as opportunities for passive recreation, water quality maintenance, education, research, and linkages to other open space areas. The potential for development is determined by factors such as current land use designation and zoning, environmental constraints such as steep slopes or wetlands, access, available utilities, and proximity to urban growth areas. Natural areas with high natural values and high development potential should be given first priority.

Once natural areas have been prioritized, other factors such as ownership patterns and parcel size should be analyzed. It is important to determine the attitudes of the property owner, or owners, with regard to natural area conservation. Conservation minded owners may be willing to provide voluntary protection for the natural area. If so, representatives from a state agency such as the Department of Conservation and Recreation, or a private organization such as The Nature Conservancy may be able to provide technical assistance by working with the landowner to assure protection. If the landowner desires compensation for conserving the site, he may be interested in a below-market-value sale, or sale of a conservation easement on the property.

If owners are less conservation minded, other strategies will be necessary. An

important factor in this case is the location of the natural area in relation to individual parcels and owners. If the designated natural area, or portion of the natural area, constitutes only a small portion of the parcel in question there may be an opportunity to conserve the natural area while still allowing reasonable use of the remainder of the site. This could be accomplished through the flexible zoning techniques described above. If, however, the natural area constitutes a high percentage of the parcel, negotiation through flexible zoning may not be feasible. In this case, it may be difficult to conserve the natural area while allowing reasonable use of the site. Under these circumstances, the only option for protecting the natural area may be acquisition of either the property or a conservation easement at market rate.

In cases where some form of acquisition, whether at or below market value, is the only option available, localities should seek creative solutions for raising the necessary funds. Local funds, either from the general budget or from the sale of bonds, can be used as seed money to attract other resources. Although scarce, grant monies from the state or federal governments or private national conservation organizations may be available to provide matching funds. Local fundraising through private conservation groups or businesses could also be added into this effort.

Whatever strategy is used must be appropriate for local circumstances such as projected growth and community attitudes. Localities experiencing, or expecting, moderate to high growth can harness development pressure to conserve natural areas. Flexible zoning techniques can be used in these localities to protect natural areas as growth occurs. In this way, as land is developed, the more sensitive features of that land, such as natural areas, are permanently protected. In the face of rapid growth, citizens may also be more willing to commit public and private funds to resource protection. Although natural areas in growing communities may be the most threatened, these circumstances may offer more opportunities for resource conservation.

Highly urbanized areas and rural areas with little projected growth may require different strategies. In these cases, it may be difficult to use local land management authority to conserve natural areas because little growth is occurring. Highly urbanized areas may have few remaining natural areas, but because of their scarcity, these areas may be highly valued by citizens. Citizens in rural localities with little expected growth, on the other hand, may not be as willing to support conservation efforts because natural resources seem abundant and unthreatened. This does not mean, however, that actions to conserve natural areas through local land management

authority are inappropriate for localities that do not expect high growth. On the contrary, a natural area conservation strategy which includes comprehensive planning and flexible land management techniques is appropriate for any locality. This type of strategy is simply more likely to be effective in growing localities that have more opportunities to use this technique.

In conclusion, there are a number of options available for localities to use to conserve natural areas. The keys to protecting these areas are good information on the resources to be preserved, a strong natural area or open space component in the comprehensive plan, land management ordinances that provide adequate flexibility, and in particular, strong public involvement and support for natural area conservation.

Landowner Contact Report

OWNER:

SITE:

Type of contact accomplished:

mail

telephone

meeting with landowner

site visit with landowner

other

Date of next contact (if applicable):

Next plan of action:

Information needed:

Notification Progress:

Date introductory letter mailed:

Date of telephone contact:

If no telephone contact, explain:

Date of visit:

If did not schedule an appointment for visit, explain:

Person(s) visited:

Date thank you letter mailed:

Additional information mailed:

Site Information:

Site name:

Quadrangle name:

Quadrangle code:

County/City:

Estimated value of land/improvements:

Access to property:

Plat map/parcel number:

Size of tract in acreage:

Resources in natural area:

Which of these resources have been documented on this tract?

In the preserve design, does this tract fall within the primary conservation boundary, the secondary, or both?

Resources observed during visit (if site visit done):

Short-term threats to these resources:

Long-term threats to these resources:

Ownership Information:

Name:

Mailing address:

Phone number:

Age:

Occupation:

Children:

How many?_____ Ages(range):_____

How long has the owner owned the tract?

Does the owner reside on the tract?

If no, what is the property address?

What is the present land use?

What are the plans for future land use?

What (if any) specific concerns were expressed by owner?

Conservation Progress:

What is the owners attitude towards conservation?

Was the owner aware of the resources prior to contact?

If yes, has the owner protected them deliberately?

What is DNH's conservation goal for this tract?

What conservation options were discussed?

What was the owners response and attitude toward these options?

What level of protection was achieved through this contact?

Does the owner appear to be receptive to stronger levels of protection in the future (if necessary):

Additional comments or observations during visit:

VIRGINIA NATURAL AREA REGISTRY

VIRGINIA'S NATURAL HERITAGE.

Virginia is a state of extraordinary natural diversity--from the sandy beaches of the Atlantic Ocean and the Chesapeake Bay, across the gentle hills of the Piedmont and the Shenandoah Valley, to the mountains of the western highland. Residents of the Commonwealth take great pride in the beauty of our natural heritage. Over 2,700 species of plants, 880 vertebrate animals and 30,000 invertebrate animals interact with Virginia's rocks, soils, and water to form unique natural communities and ecosystems. However, some of the species and ecosystems which flourished in Virginia's past are threatened today. As the human population increases, so does the need for conversion of natural lands to other uses. As a result, the land of which certain plants and animals depend upon for survival may be permanently damaged or destroyed. Fortunately, we are learning to take precautions and property owners are acting voluntarily to safeguard the best that remains of our natural world.

WHAT IS THE REGISTRY OF NATURAL AREAS?

Virginia's Registry of Natural Areas is a program developed to encourage voluntary conservation of significant lands in private and public ownership. Our staff has identified over 900 natural areas throughout the Commonwealth which support natural heritage resources. The landowners of these sites play a crucial role in the conservation of such lands and in turn the future survival of the natural communities and rare species they support. Species are often lost simply because the landowner is unaware of its existence and needs. By informing and recognizing the landowners of these significant natural areas, the Registry of Natural Areas program reduces the chance that these resources may be unknowingly destroyed. The program is operated by the Virginia Department of Conservation and Recreation, an agency which is devoted to the identification and protection of the Commonwealth's most significant natural areas.

WHAT AREAS QUALIFY FOR THE REGISTRY?

To be eligible for placement on the Registry of Natural Areas, a property must support significant natural heritage resources for Virginia, such as:

- 1) habitat for rare, threatened, or endangered plants or animals.
- 2) rare or state significant natural communities.
- 3) significant geologic landmarks.

WHAT SAY DOES THE LANDOWNER HAVE IN THE REGISTRATION PROCESS?

The decision to register belongs entirely to the landowner. This

is a voluntary and nonbinding agreement and may be terminated by either party at any time.

DOES REGISTRATION OF A NATURAL AREA PERMIT PUBLIC ACCESS
TO PRIVATE PROPERTY?

No. Registration of a Natural area provides no rights of public access to private property. As with any private land, visitors must receive permission from the landowner before entering the property. Locations of registered natural areas are not publicized unless the owner so desires.

WHAT COMMITMENT DOES THE LANDOWNER MAKE?

Landowners who participate in the Virginia Registry of Natural Areas commit to the following:

- 1) to voluntarily preserve and protect the natural heritage resources on their land to the best of their ability;
- 2) to notify the Virginia Department of Conservation and Recreation of any potential threats to these resources, such as pollution, clearing of land, etc.;
- 3) to notify the Virginia Department of Conservation and Recreation of any intent to sell or transfer ownership of the property.

WHAT RECOGNITION DOES THE LANDOWNER RECEIVE FOR THIS COMMITMENT?

In honor of the voluntary commitment to protect the natural area, the landowner will receive a plaque recognizing the land for its significant features and the owner for their stewardship commitment.

DOES THE OWNER RECEIVE ANY FINANCIAL INCENTIVES?

No. However, there are other protection methods available, such as conservation easements and natural area dedication which could offer tax incentives.

IS MANAGEMENT ASSISTANCE AVAILABLE TO THE OWNER OF A REGISTERED AREA?

Yes. Management assistance will be provided upon the landowner's request.

VIRGINIA'S REGISTRY OF NATURAL AREAS
AGREEMENT FORM

I, _____, owner of the _____ Natural Area agree to include the area described and bounded on the enclosed map in Virginia's Registry of Natural Areas. I agree not to take any intentional action which could destroy or degrade the natural area so long as the property is registered.

I agree to allow qualified representatives of the Department of Conservation and Recreation to visit the property a minimum of once per year with prior notice to examine the condition of the natural area and the natural heritage resources within. Should I observe any significant change in the condition of the natural area or any of the resources within, I agree to notify the Department of Conservation and Recreation.

I agree to notify the Department of Conservation and Recreation at least 30 days before I transfer by any means the title to the registered property or decide for any reason to withdraw from this agreement.

It is understood that this agreement involves no change of title or loss of ownership rights. The agreement solely expresses the landowner's sincere intention to protect certain natural heritage resources and the Department of Conservation and Recreation's desire to recognize the importance of the property and the landowner's civic gesture by awarding a plaque. Neither party shall incur any liability for any injury to persons or property on the land.

By _____
Property owner

Date

By _____
Director
Department of Conservation and Recreation

Date

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